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JULY–AUGUST 2021

CARP on a FLY

IN THIS ISSUE:

DEPLOYING THE AIS OFFENSE

HOW TO CATCH AND EAT CRAYFISH

THE STREAM ACCESS LAW GETS A WORKOUT

SAVING BIRDS AND A BARN ON FLATHEAD LAKE

Montana Outdoors

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Montana Outdoors

JULY–AUGUST 2021

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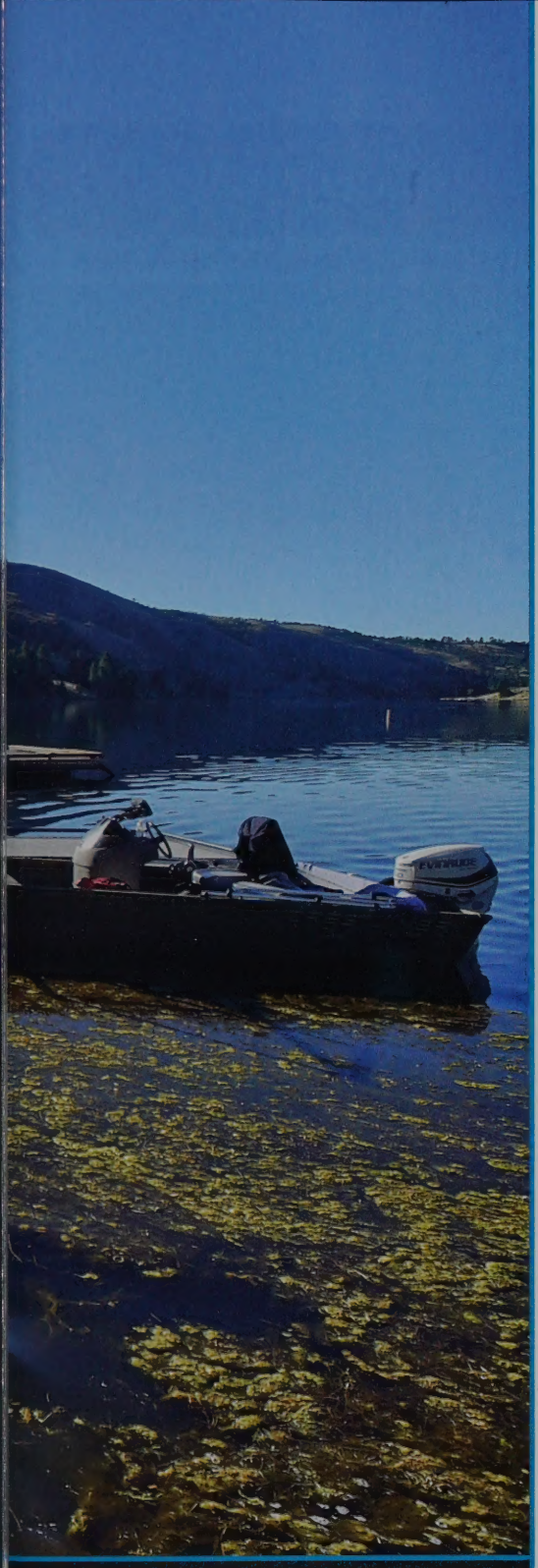


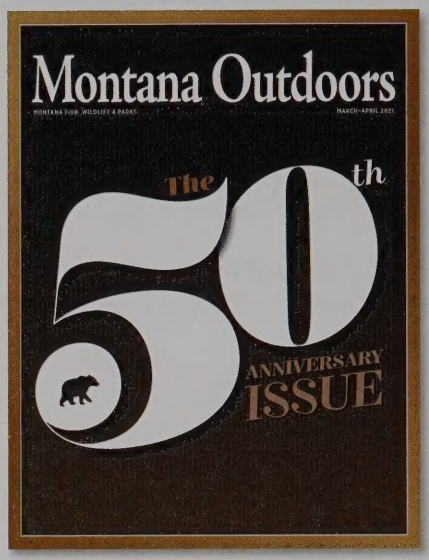
AIS A specialist with the FWP Aquatic Invasive Species (AIS) Bureau prepares to inspect organisms and plants he netted from shallow water. See page 32 to learn how this and other activities of the AIS "offense" are helping spot problems before they worsen. Photo by Thom Bridge.

FRONT COVER An angler shows off a fly-caught carp on the Missouri River near Townsend. See page 14 to learn why fly anglers across Montana are pursuing these oversized members of the minnow family. Photo by Dan Lohmiller.

You're too kind!

Every issue of *Montana Outdoors* is a visual and intellectual feast. Each one seems to outdo its predecessor, with great writing, great photography, and great graphics. And now comes the 50th anniversary issue. What a delight. Celebrating the steady gains of dogged, insightful, prescient leadership in preserving and enhancing our beloved Montana over the past half-century through the magazine deepens our resolve to stay the course.

Andrew D. Scrimgeour, PhD
Archivist Emeritus, Society of Biblical Literature, Dean of Libraries Emeritus, Drew University
Madison, NJ



I have just finished my third reading of the 50th anniversary issue, and each time I have experienced an even greater need to congratulate you on an astounding tribute to the *Montana Outdoors* legacy. You have presented a well-deserved and respectful acknowledgment of the magazine's pioneers, including the staff, photographers, and story contributors. Thank you for continuing the tradition of thoughtful and meaningful commentary together with astonishing visual depictions of life in the great outdoors of Montana.

Jerry Hoover
Helena

Congratulations on celebrating 50 years of a fantastic magazine. Your 2013 "Best 100" issue sits on my bedside table still and serves as a jumping-off point when experiencing a little Montana-based wanderlust. As a teacher, I really appreciate the literacy lessons you have started releasing and have used several of them with my middle school students. Here's to another 50 years and more. Thank you for making me and my mailbox so happy six times a year.

Leslie Dalbey
Polson

I really enjoyed the walk through memory lane in the 50th anniversary issue. I commend your magazine for trying to seek out both sides (or all 10 sides) of the truth for controversial issues. May this continue to be a goal for every article. The "Anatomy of an Article" was fun to read, and the graphic design article by art director Luke Duran was eye opening. I've always been dazzled by the photography in the magazine but now I know why: His process of placing artwork into articles creates top-notch subtle perfection. And big kudos to those supplying the artwork. Thanks again for a great product.

Melissa Glaser
Ennis

State park visitation avalanche

Your article "Overwhelmed" (November-December 2020) detailed a dire picture of the 2020 recreation season in Montana's state parks—and especially for its workforce. I found it highly troubling to read of employees working 16-hour shifts, 90 days straight, and feeling threatened and vulnerable at work. None of us can be at our best in these circumstances.

The need and demand for outdoor recreation far exceeds the system's ability to provide it. That reality is one that will require a long-term approach to find solutions. In the meantime, FWP must not allow its workforce to try and fill gaps by sacrificing their own health and well-being with unsustainable work schedules. The article also indicated that the 2021 recreation season is likely to be just as challenging. I hope you have planned and prepared.

Dave Hays
Boise, ID

After reading "Overwhelmed" in the November-December 2020 issue of *Montana Outdoors*, I was stunned that the state parks staff were treated so poorly by Montanans at our state parks. Last year brought out the worst and then the best in people. I am so very sorry that park rangers and other were treated with utter disrespect. I have never been a person to speak up, but this year I have. I promise you, I will never let anyone in my presence disrespect any state park facility or employee. A few bad apples can ruin the entire barrel.

Diane Fischer
Billings

More on lead and eagles

After reading your article on lead and eagles ("Choosing the Unleaded Option, September-October 2020), I became alarmed. I have been eating elk and deer meat, harvested with a Winchester .270, almost exclusively for 43 years. I had never considered lead fragment spray in the animals' tissues. Over the years I have surely ingested a considerable amount of lead. I requested my physician to run a blood test to check for lead. To my great relief, the analysis returned negative. I thought your other readers might like to know.

Ed Wolff, DVM
Stevensville

EDITOR REPLIES: The effects of lead in venison on human health is still not well understood by health professionals. As several readers noted, people have been eating game animals killed with lead bullets for hundreds of years. One difference, though, is that modern cartridges are much faster and designed to greatly expand upon impact, increasing the amount of fragmentation within the animal's body. Also, the effects of lead in paint, plumbing, and bullets are generally less significant on adults than on developing fetuses or very young children.

Corrections

In our 50th anniversary issue (March-April 2021), we mistakenly wrote that *Montana Wildlife* editor and FWP cartoonist Vern Craig was a B-52 gunner in WWII. As many readers have pointed out since, the B-52 did not enter service until the early 1950s. We meant to write B-25.

A few readers wrote to say that the best way to harvest wild asparagus, featured in the May-June "Eating the Outdoors" column, is to cut the stem with a knife at an angle 1 inch below the ground, to encourage new growth. And a health specialist advised that hollandaise sauce, also mentioned in that column, should always be made with *pasteurized* eggs—in the shell or in liquid or dry form—to prevent food-borne illness. ■

Montana Crayfish Boil

By David Schmetterling | Preparation time: 30 minutes | Cooking time: 40-45 minutes | Serves 2-4

INGREDIENTS

- 2–2.5 gallons water
- 1 (4-oz.) package crab boil seasoning (Zatarain's or other)
- 1/4 c. Old Bay seafood seasoning
- 1 c. kosher salt
- 4–6 bay leaves
- 3–4 lemons, halved
- 3–4 garlic heads, halved crosswise
- 3 yellow onions, halved
- 6–8 red potatoes, halved
- 1–2 pounds andouille sausage
- 4 ears corn, shucked and cut into 3–4 pieces each
- 25–40 live fresh crayfish, purged (12–24 hours)

DIRECTIONS

Bring water to a rolling boil in a large stock pot.

Add crab boil and Old Bay seasonings, salt, bay leaves, lemons, garlic, and onions. Stir until spices are dissolved.

Add potatoes and return to a boil. Boil 15 minutes.

Add sausage and reduce to a simmer for 5 minutes.

Add corn and simmer 10 minutes.

Add crayfish and simmer 5 minutes (don't overcook).

Pour mixture through a large colander. Discard lemons and seasoning pouch.

Serve with any commercial hot sauce. ■

Crayfish (crawfish) are generally thought of as aquatic crustaceans of the American South, where "crawfish boils" are a culinary tradition. But Montana also has crayfish, sometimes called crawdads, and these small cousins of the saltwater lobster can be harvested and cooked just as they would be in Louisiana or Mississippi.

The two most common species here are the native signal crayfish, found in western Montana, and the virile crayfish, which is native to eastern Montana but has spread statewide due to people illegally dumping them in lakes.

Crayfish are fun to catch, either by using traps, snatching them up while snorkeling, or when walking the banks of lakes or big rivers at night with a flashlight and plucking them from the shallows.

To trap crayfish, use fresh cut-up fish as bait. Tie bait in a cheesecloth bag and use wire to suspend it inside a minnow or crayfish trap so the bait doesn't touch the sides. This way the crayfish have to go into the trap to get the bait.

If you go crayfishing, make sure to check the Montana fishing regulations and bring your fishing license and a cooler of cold tap water (it's illegal to transport water from any waterbody). Once home, keep the live crayfish in the cooler for 12 to 24 hours so they can evacuate their hindgut (the "vein" on top of their tail meat), known as "purging." This also eliminates debris in their gills and on their bodies. To keep the water well below room temperature, drain and refill the cooler a few times.

A boil is traditionally a social event that calls for cooking 100 or more crayfish. Here's my recipe for a more modest affair, serving just two to four people. This recipe is a typical Southern boil, using andouille sausage to add spicy, smoky flavor.

Traditionally a boil is drained and the pot contents dumped out on a newspaper in the middle of a table. My wife and I are Northerners, so we use plates.

—David Schmetterling coordinates the FWP Fisheries Research Program.

SHUTTERSTOCK

Same direction, different approach

I'm not a scientist, but over the past nearly two decades I've had the good fortune to work with some of the nation's best wildlife and fisheries scientists here at FWP.

One of the many things I admire about those biologists, including their integrity and intellect, is the emphasis on asking questions: Why are moose numbers declining in one part of Montana but not another? How much cold water do bull trout need to survive? What factors limit grizzly bear population growth?

Scientists are right to be skeptical about what they and others observe. For instance, in the 2010s it appeared that wolves were causing declining elk numbers in the upper Bitterroot. But when FWP scientists rigorously tested that hypothesis, they learned it was mostly mountain lions that were eating into the area's elk herds.

This investigative process, known as the scientific method, reveals new information, new ways of getting things done, and new insights. It aims at improvement.

Inspired by this approach, I've asked everyone in FWP to apply it to the ways we conduct business.

For example, we recently reviewed and adjusted the approval process for our native fish habitat restoration projects. We are now giving proposed projects more public oversight—via the FWP commission, whose role is to represent the public's interest—in order to flag potentially controversial management actions and deal with them ahead of time.

We're taking the same approach to evaluating our wildlife research. Here we're looking at how effectively information gleaned from completed studies has been applied to wildlife management decisions. There's a real efficiency in applying research findings as much as circumstances allow, including outside the original study areas. We need to make sure that wildlife biologists across the state are fully aware of completed research projects and how the results might help them manage wildlife in their areas.

Informing management decisions and then appropriately monitoring the results is an adaptive approach to making effective use of completed research. In short, we're redoubling our efforts to make sure sound research projects from some of the world's top wildlife research scientists are applied wherever it makes sense to do so.

Why evaluate these and other FWP management processes? Because we're a public agency with an especially important responsibility: stewarding Montana's fish, wildlife, and state parks. We never have and never should stop striving to do better—to be more efficient, more transparent, and more effective. It would be irresponsible to do otherwise.

This analytical approach in no way changes this agency's overall direction. We maintain our commitment to serving the public, embracing the public trust, using science, and honoring tradition.

Rest assured: We're staying the course of scientifically informed management and transparent processes. Montana will continue to manage viable grizzly bear and wolf populations. Stewardship of bull trout, cutthroat trout, pallid sturgeon, and other at-risk native species will remain a major focus of FWP fisheries management. As it has been for decades, habitat will continue to be the foundation of wildlife and fisheries conservation.

This analytical approach in no way changes this agency's overall direction. We maintain our commitment to serving the public, embracing the public trust, using science, and honoring tradition.

But what may change is how we go about achieving these goals. We will look at all the processes this department conducts, ensuring each is as transparent, cost-effective, customer-focused, and socially sustainable as possible.

We may adopt some new ways of doing business, but the bottom line of our business—stewarding Montana's fish, wildlife, and state parks—will remain the same as always.

—**Hank Worsech**, Director, Montana Fish, Wildlife & Parks

LINDA THOMPSON

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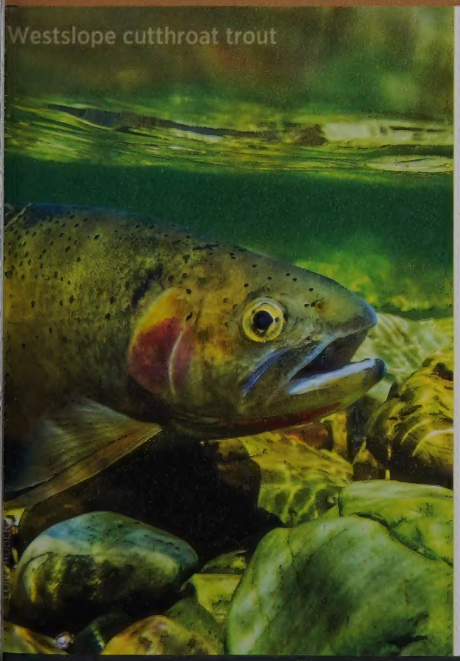
Westslope cutthroat trout

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THOM BRIDGE

WATER QUALITY WATCHDOG

TREVOR SELCH
Water Pollution Biologist, Helena

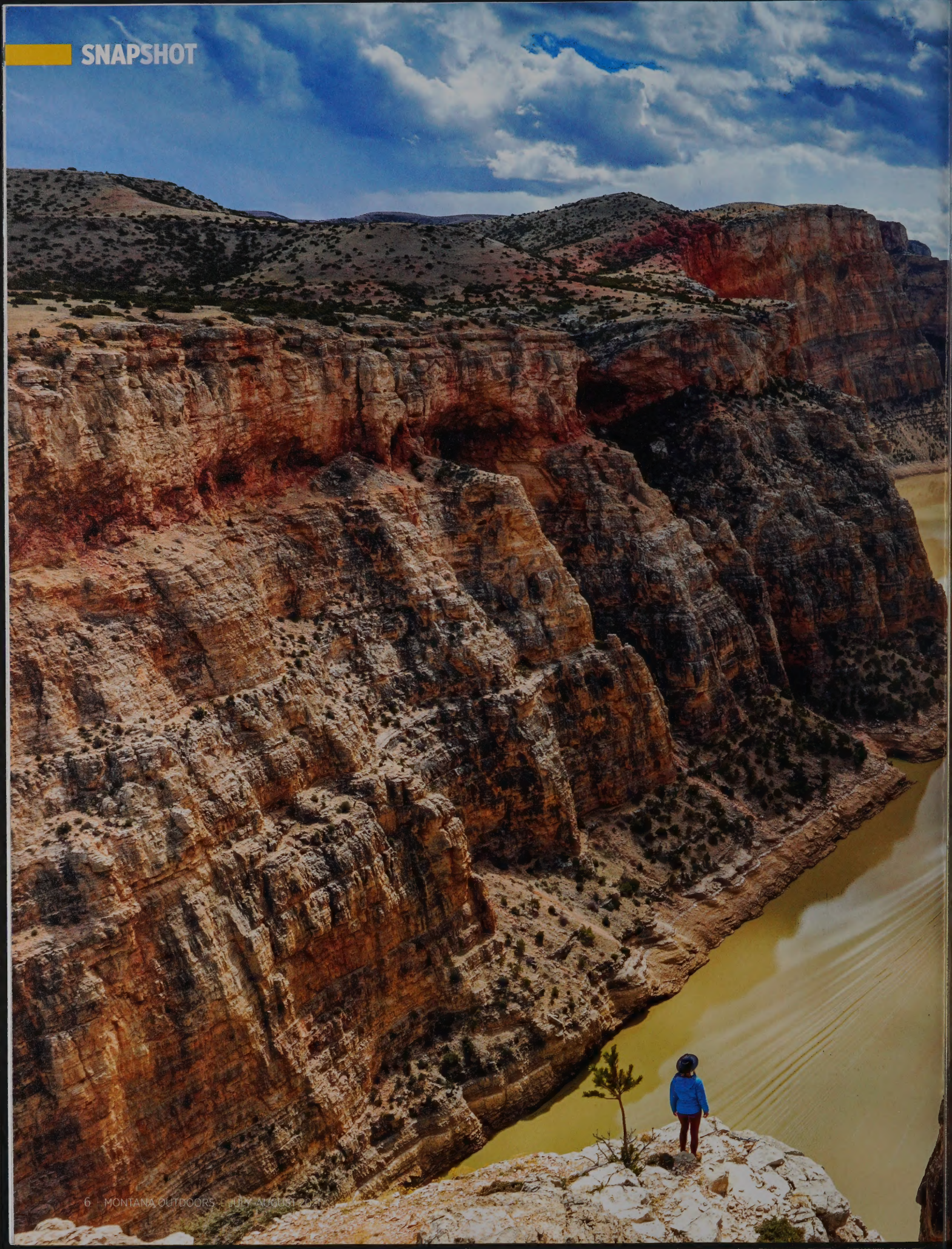
AS THE FWP FISHERIES DIVISION'S water pollution biologist, my job is to investigate anything that degrades water quality and harms aquatic communities. That includes things like acid mine drainage from abandoned gold and silver mines, oil spills such as the ones in 2011 and 2015 on the Yellowstone River, algae blooms and eutrophication caused by excess nutrients washing in from increased farm and lawn fertilizer use, and contaminants like dioxins entering waters from Superfund sites.

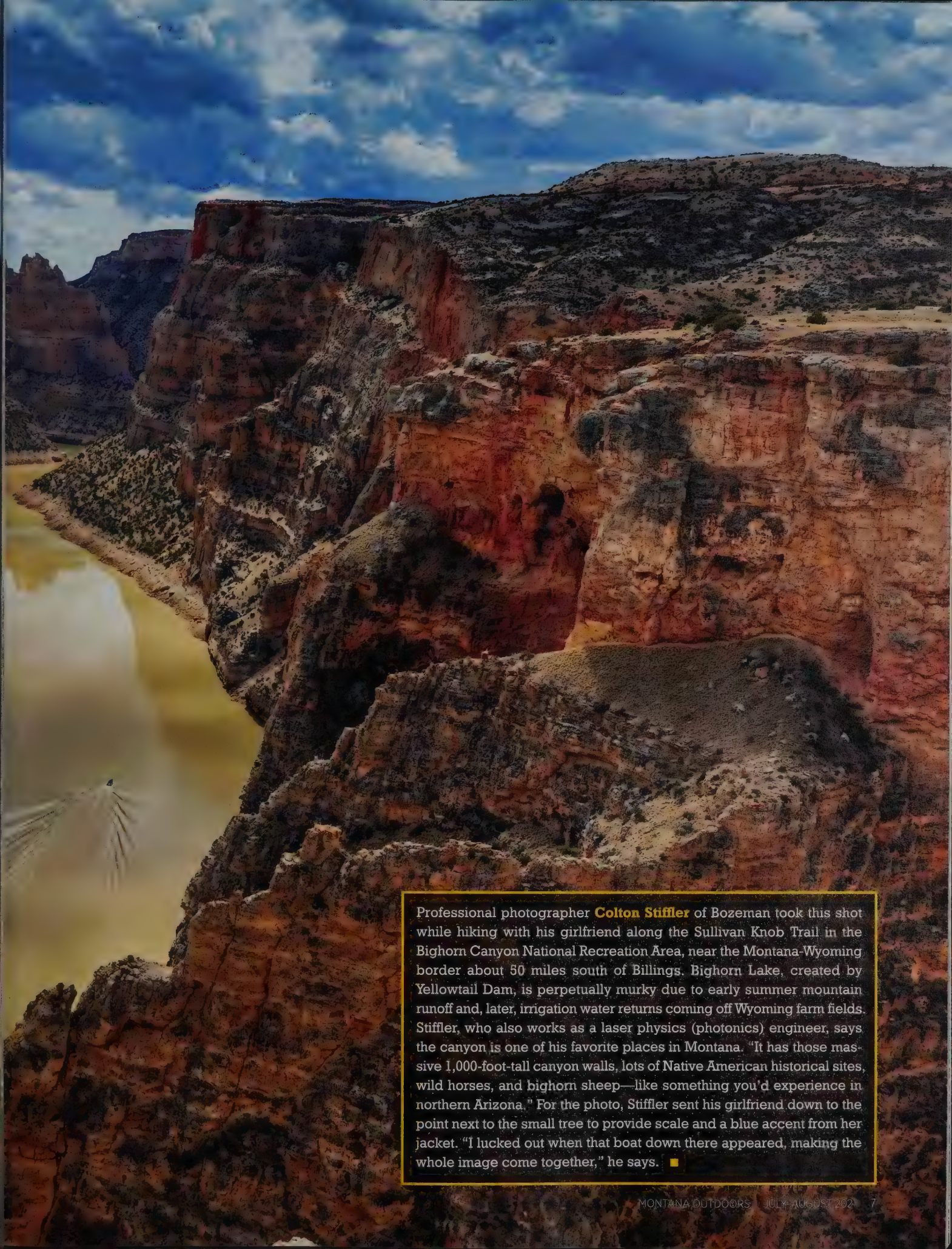
In the photo shown here, I'm using what's called a Secchi tube, which measures water clarity in a river or stream.

Fish habitat is a stool with three legs: water quantity, physical habitat, and water quality. Here in Montana, all of FWP's water pollution biologists dating back to the early 1950s have been responsible for that third leg. I've been with the department for nearly 14 years, after earning my doctorate from South Dakota State University studying factors affecting mercury accumulation in fish.

What I like about this job is that I get to be out in the field, working across the state investigating toxins and stressors to fish and other aquatic organisms and working to reduce toxins entering waterways and harming aquatic life. I'm also responsible for developing the statewide fish consumption guidelines, now available on the FWP website for every Montana waterbody. Mercury and other chemicals may be in the fish people eat, so they need to know what amount they can consume to reduce health risks.

The project I have been most proud to work on so far was the PCB cleanup at Big Spring Fish Hatchery outside Lewistown in the early 2010s. The carcinogens, first detected downstream in Big Spring Creek, came from widely used commercial paint that FWP had applied in the 1970s to line the hatchery's raceways. It was satisfying to be part of a community-supported effort to clean the entire hatchery as well as a 3-mile stretch of the creek downstream, and then to continually test the fish and stream sediment afterward and see that PCBs have been reduced to a level that allows for fish consumption.





Professional photographer **Colton Stiffler** of Bozeman took this shot while hiking with his girlfriend along the Sullivan Knob Trail in the Bighorn Canyon National Recreation Area, near the Montana-Wyoming border about 50 miles south of Billings. Bighorn Lake, created by Yellowtail Dam, is perpetually murky due to early summer mountain runoff and, later, irrigation water returns coming off Wyoming farm fields. Stiffler, who also works as a laser physics (photonics) engineer, says the canyon is one of his favorite places in Montana. "It has those massive 1,000-foot-tall canyon walls, lots of Native American historical sites, wild horses, and bighorn sheep—like something you'd experience in northern Arizona." For the photo, Stiffler sent his girlfriend down to the point next to the small tree to provide scale and a blue accent from her jacket. "I lucked out when that boat down there appeared, making the whole image come together," he says. ■

To get high enough to take this overhead shot last summer of friends fishing a bend of the South Fork of the Flathead River, about 10 miles upstream of Hungry Horse Reservoir, **Will Phelps** had to climb a steep, crumbly mountainside. "I'm a rock climber, so I'm used to going up slopes like that. But it was still hard to get high enough to pull off that shot," says Phelps, who works as a videographer and photographer for a travel agency and production company in Kalispell. He adds that what he likes best about this photo is how the high vantage point shows the river's depth and clarity. "Plus that red raft really pops and works well against the blue-green water," Phelps says. ■

925

Cost, in dollars, for a nonresident to hunt an elk in Montana (includes upland bird hunting and fishing). Cost for a Montana resident to hunt an elk: **$38**

Shawn Stewart began working for FWP the same year Disney World opened, FedEx was founded, and The Doors' Jim Morrison died. That was 1971, when Stewart, a 19-year-old Montana State University student, landed a part-time fisheries technician position with the then-called Montana Department of Fish and Game. "I bugged people there until they gave me a job," Stewart says.

A half-century later, Stewart is celebrating his 50th anniversary, making him the longest-serving agency employee on record.

Since 1976, Stewart has been an FWP wildlife biologist based in Red Lodge. He says that even after all these decades, the work never gets old. "I've broadened my scope from big game to include nongame species," he says. "And with that has come working with an expanding range of people interested in wildlife, from hunters to bird watchers to photographers. That's made my work more and more lively and challenging."

When does the 69-year-old biologist plan to retire? "When it stops being fun," Stewart says. He says he recently had the opportunity to fly with an FWP pilot over the Beartooth Mountains looking for several radio-collared grizzly bears. "It was so beautiful, with fresh snowfall everywhere, as we looked for those bears. It was one of the greatest days of my life." ■

FISHING

Fish records tumble at record pace

For reasons unknown, anglers have been toppling fish records during the past year like never before. By mid-May, anglers had already broken eight records since August 2020, including one, for the longnose sucker, that was broken again two months later. Most years, records for only a few species are broken, and some years not a single record-breaker is caught.

The most widely publicized trophy during the past year was a massive 32.43-pound, 37-inch brown trout caught in March 2021 on the Marias River below Tiber Reservoir, 50 miles north of Great Falls. "It proves that monsters do exist, and it's proof that you never know and it just takes that one cast," angler Robbie Dockter of Conrad told the *Independent Record*. The salmon-size trout, taken with a Kastmaster spoon on 4-pound-test line, easily surpassed the previous record, a 29-pound brown caught in Wade Lake in 1966.

Another front-page record-breaker was an 18.02-pound, 32.35-inch walleye caught on a jig in May at Holter Reservoir. Adam Strainer, FWP fisheries biologist in Helena, says his crews had previously caught walleye in their survey nets that could have topped the state record, "so it was just a matter of time before an angler caught one." The previous state walleye record was set in 2007 with a 17.75-pound fish caught on Tiber Reservoir.

Other recent state record fish include a:

- 32.05-pound chinook salmon caught last August on Fort Peck Reservoir
- 7.84-pound smallmouth bass taken in October at Fort Peck
- 1.91-pound yellow bullhead landed at Tongue River Reservoir in December
- 3.27-pound longnose sucker caught in March in the Marias River near Loma
- 9.575-pound largemouth bass taken at Noxon Reservoir in April
- 4.21 pound-longnose sucker caught on Holter Reservoir in mid-May—the second record for this species in three months.

What accounts for the spate of record-breaking catches? "I'd like to say it's due to our excellent fisheries management," jokes Eileen Ryce, FWP fisheries chief. "But seriously, I can say that all these records being broken for so many species does indicate the wide diversity of fishable waters we have here in Montana, the quality of our fish habitat, and the great fishing access that's available." ■

Robbie Dockter, of Conrad, with his jaw-dropping Montana state record brown trout. He told a reporter he wished his daughter Sierra, who was with him, had hooked the lunker instead. "It would have been cooler to see her catch it."

CLOCKWISE FROM TOP LEFT: CARTOON BY MIKE MORAN; SIERRA DOCKTER; THOMAS LEE

BOAT AND WATER SAFETY

A Montana PFD primer

Find a PFD that fits your body and water activity.

More and more people are kayaking, paddleboarding, and boating on Montana's lakes and rivers each year. If you're one of them, or plan to take up a water sport for the first time in 2021, it's a good idea to review the state's legal requirements and the options for the single most important piece of boating gear you can own: a life jacket, also known as a personal flotation device, or PFD.

The law: State law requires that all boats (including kayaks, paddleboards, and canoes) have one U.S. Coast Guard–approved wearable life jacket for each person onboard. Boats 16 feet and longer must also carry a U.S. Coast Guard–approved throwable personal flotation device that is immediately available for use.

Children under 12 are required to wear a life jacket onboard. Though it's strongly recommended, teens and adults don't have to wear life jackets, but PFDs must be readily accessible on the watercraft—located out in the open where they can be easily reached.

Options: The most important thing to consider is fit. Also, wear a life jacket that is right for the activities you do most. Styles include whitewater, personal watercraft, paddling, and float coats for hunting. OutdoorGearLab compares 10 paddling PFDs at outdoorgearlab.com/topics/paddling/best-pfd.

Another option is an inflatable life jacket or belt. These are the least bulky and most comfortable PFDs in hot weather. They inflate with compressed gas (CO_2), either automatically when the jacket is submerged or manually with the pull of a rip-cord. REI provides a comprehensive review of PFDs, including inflatables, at rei.com/learn/expert-advice/personal-flotation-device.html.

Labels: Looking to upgrade? Be prepared to see new U.S. Coast Guard labels when shopping. The Coast Guard has replaced the previous Type I, Type II, etc. designations with a labeling system that relies more on icons and less on words. The new labels don't mean boaters must buy new life jackets. Older U.S. Coast Guard–approved life jackets and flotation aids are still legal if in good wearable condition. Both labeling systems indicate the size of the life jacket and that it is U.S. Coast Guard–approved. New life jackets also include an information tag explaining the different types of icons. The icons indicate which activities the jacket is best suited for and whether it will turn an unconscious person face up. ■

TOP TO BOTTOM: SHUTTERSTOCK; USFWS

Moss ball mussel crisis averted

On March 1, U.S. Geological Survey scientists learned that zebra mussels had been found on and in imported moss balls sold as aquarium plants nationwide by a California distributor. Within a week, zebra mussels had been discovered on moss balls in most states, including Montana, and in Canada.

Zebra mussels are an invasive species and pose major threats to aquatic ecosystems, irrigation systems, and hydropower facilities. Mussels in moss balls are a problem because, though illegal, people often dump their aquarium water into lakes and rivers.

Staff from the FWP Aquatic Invasive Species Bureau visited every pet store in the state and removed all moss balls while providing the stores with information on threats posed by invasive mussels.

Moss balls are made in Ukraine, where zebra mussels are native, by collecting wild algae and forming it into small spheres ranging in size from golf balls to cue balls. They are used in home aquariums to absorb harmful nutrients in the water and limit the growth of undesirable algae. People also use moss balls for home decoration.

Tom Woolf, FWP AIS Bureau chief, says the quick nationwide action helped prevent invasive mussels from entering new waterways. "A pet shop employee in Washington first noticed the mussels in the moss balls," he says. "It's a great example of someone spotting something odd and reporting it."

Woolf says people who have purchased moss balls in the past several months should remove them from aquariums, place them in a plastic bag, and put them in a freezer overnight to kill any mussels or other invasive organisms present. Then they should throw the bag in the trash. "Never dump aquariums into storm drains, lakes, or rivers," Woolf says. "Aquarium pets are a common source for all kinds of invasive introductions." ■

FWP VIDEO SHOWCASE

A sample of seasonal videos produced by FWP staff throughout Montana for social media and television.

Amphibian adventure
Join Montana WILD volunteer Matt Bell as he explores the wet (and dry) worlds of Montana's frogs, toads, and salamanders. Bell will also explain how the term "ectotherm" is more accurate for these species than "cold blooded."

How to clean a burbot
FWP Education Program assistant Ryan Schmaltz takes viewers inside the burbot's odd anatomy and demonstrates how to clean this strange but delicious cousin of the saltwater cod.

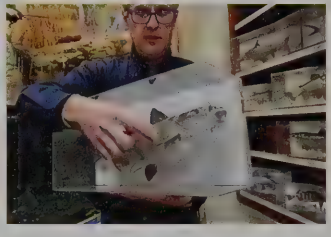
QR Codes

QR codes are square boxes of squiggly symbols you increasingly see on products, signs, billboards, menus, and more. QR codes (which stands for "quick response") are similar to bar codes on grocery store and retail products. But instead of showing a product's price, a QR code creates a link to a website URL, like for a YouTube video. To view the FWP videos featured here, scan the QR codes using your smartphone camera, like you'd take a photograph. The app in the phone reads the code and navigates to the YouTube site.

Note that all iPhones have a QR code reader already installed, and it opens automatically when you scan a QR code with the phone's camera. For other smartphones, download a free QR code reader from any app store and then open the reader to begin scanning. ■

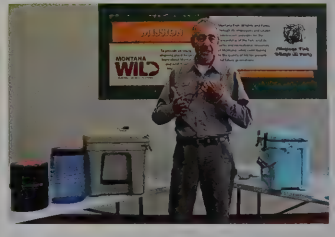
Another way to view these videos is by searching for the titles listed here on youtube.com or subscribing to the FWP YouTube channel.

Big Hole pronghorn migration
FWP captured and collared several pronghorn near the Big Hole Valley as part of a statewide migration study. Follow one doe as she migrates 80 miles to and from the Mount Haggin Wildlife Management Area.



Meet Montana's catfish
Join Dave Hagengruber, FWP regional Information and Education Program manager, as he discusses Montana's four catfish species—channel catfish, yellow bullhead, black bullhead, and madtom—and their amazing adaptations.

Is it a lynx or a bobcat?
FWP Youth Education Program coordinator Corie Rice explains the different features that distinguish a bobcat from its close cousin, the Canada lynx, and how to tell the two species apart in the field.



How to secure "smellies" in bear country
Join Montana WILD Education Center volunteer Bill Cook as he explains how to keep grizzly bears and black bears from sniffing around your camp and getting into your cooler, tent, or vehicle.

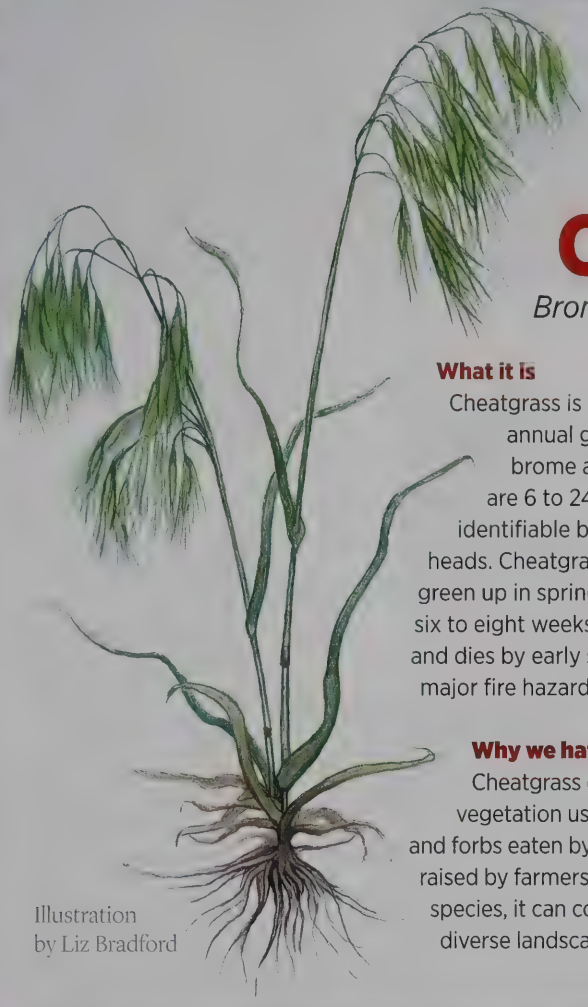


Illustration by Liz Bradford

Cheatgrass

Bromus tectorum

What it is

Cheatgrass is an invasive non-native winter annual grass. Also known as downy brome and military grass, the plants are 6 to 24 inches tall and are easily identifiable by their dense, drooping seedheads. Cheatgrass is one of the first plants to green up in spring and stays that way only for six to eight weeks. Then it turns reddish to tan and dies by early summer, when it becomes a major fire hazard.

Why we hate it

Cheatgrass can outcompete native vegetation used by wildlife, native grasses and forbs eaten by cattle, and winter wheat raised by farmers. Like many native invasive species, it can completely replace a vibrant and diverse landscape of dozens of native plant species with a monoculture.

Because cheatgrass are the first plants to green up in spring, they steal soil moisture from other vegetation. They are also the first to cure in midsummer, and are extremely flammable. Native plants and forbs evolved in fire regimes that happen only every several years, and later in the season. But cheatgrass thrives in the midsummer fires it fuels, often every year. The early, frequent fires eventually kill native vegetation from areas where cheatgrass is present.

Where it's found

Cheatgrass is found in every Montana county on both urban and rural open, dry habitats, ranging from abandoned parking lots to rangeland.

How it spreads

Cheatgrass seeds stick to animal fur and human clothing, spreading the plant's abundant seeds. ■

THE MICRO MANAGER

A quick look at a concept or term essential to fisheries, wildlife, or state parks management.

"Perched Culvert"

Before a road is built crossing a stream, a culvert (metal pipe) is installed so the stream water can continue to flow underneath the roadway. Most culverts are 12 to 18 inches across and are found beneath the hundreds of thousands of miles of county and logging roads in Montana, especially in the state's western forests.

Most fish, which need to move upstream to spawn in tributaries and then downstream afterward, can swim through culverts. But they can't when the culvert becomes "perched."

A perched culvert is one with a downstream outlet that sits higher than the streambed, creating a small waterfall too high for upstream-moving fish to enter. They aren't installed that way. The perching effect is caused over time as heavy stream flows move through too-small culverts, causing increased water velocity that erodes the stream at the pipe's outlet.

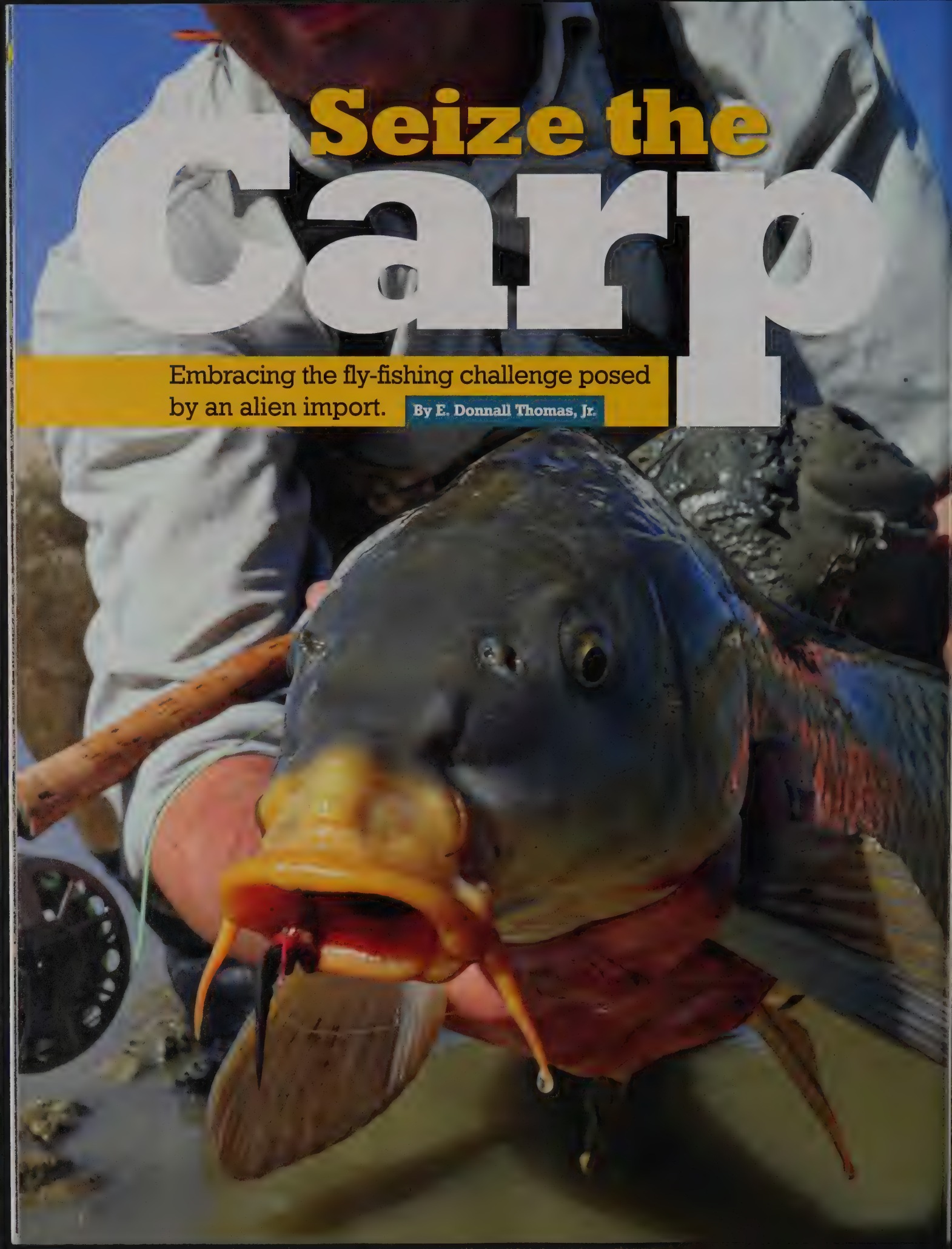
Across western Montana, perched culverts impede native bull trout population recovery by blocking upstream movement of bulls trying to reach spawning habitat. Perched culverts also block other fish species, especially those like sculpins that can't leap well.

Fish can't swim upstream when a culvert "perches."

A sole benefit of perched culverts and other fish barriers is they prevent non-native brook trout and rainbow trout from moving upstream and competing or hybridizing with native bull trout or westslope trout.

FWP biologists identify perched culverts and work with the U.S. Forest Service, U.S. Fish & Wildlife Service, timber companies, and other agencies to replace them with bigger culverts or bridges that can better handle heavy stream flows and do not create downstream erosion over time. ■

SHUTTERSTOCK



Seize the carp

Embracing the fly-fishing challenge posed by an alien import.

By E. Donnall Thomas, Jr.

Like many reservoirs in eastern Montana—especially Fort Peck, the mother of them all—Deadman's Basin strikes the eye as an anomaly: all that water in the middle of nowhere, surrounded by dry plains and hills. Located about 20 miles east of Harlowton, it's a popular weekend destination for anglers in a part of the state where fishing opportunities are scarce. As my wife Lori and I rolled into the parking area, small boats dotted the lake with local anglers trolling for hatchery-reared trout and tiger muskies. We grabbed our tackle from the back of the truck and set out along the shore with something different in mind.

We had come in search of carp. The previous summer, I had begun experimenting with catching carp using flies. Now it was early June, when carp would be up in the shallows where we could wade and sight-cast to them much the same way I pursue two of my favorite saltwater quarries: bonefish and red drum. While I didn't consider myself a carp expert, my vest contained several patterns that had worked for me before. Lori and I made our way down the shoreline carrying nothing but fly rods, with one of our Labs plodding happily along behind.

"Queen of Rivers"

The common carp (*Cyprinus carpio*) is not native to North America. The species originated in central Eurasia, but, thanks to human encouragement, it traveled early, often, and well. Carp have fascinated people for thousands of years. Aristotle wrote about them, and they were the subject of the world's first treatise on fish farming, written in China in 473 BC. Monks brought carp to the British Isles in the 13th century, and angling icons Izaak Walton and Dame Julia Brenner both admired these oversized members of the minnow family. Walton described carp as "...the Queen of Rivers, a stately, a good, a very subtil fish..." before going on at length about how to catch them.

"Carp and Waterweeds," ink on silk hanging scroll, by Yōgetsu, a Japanese monk who lived in the late 15th century.

LEFT TO RIGHT: LISA BALLARD; THE METROPOLITAN MUSEUM OF ART, PUBLIC DOMAIN

Outdoor writer E. Donnall Thomas, Jr. has written hundreds of articles and essays and more than a dozen books. He lives in Lewistown.

No one knows exactly when carp reached American shores, but the first official account dates from 1877, when Rudolph Hessel, a biologist working for the federal government, imported carp from Germany to a pond in Maryland. Political patronage in the nation's nearby capital fueled their dispersal from there. Because of the carp's size, novelty, and culinary qualities, demand grew.

At first, the then-called the U.S. Fish Commission shipped live carp only to prominent citizens. In this manner carp first reached Montana. In his 1971 book *Fishes of Montana*, Dr. C.J.D. Brown, a former fisheries professor at Montana State University, reports the following quote from a Helena newspaper in 1886: "Hundley and Pruitt... received from Washington [D.C.] 100 German carp and put them in a pond in their valley.... The fact that they can be cultivated successfully here will be worth millions to the territory."

By the early 1900s, the federal agency was shipping carp by rail to anyone who wanted some. Recipients picked the fish up at rail stops and released them in local waters. Through this process, carp were eventually introduced throughout the Missouri and Yellowstone drainages and into almost every major reservoir in eastern Montana. Carp don't do as well in cooler waters, so they never became prevalent west of the Continental Divide, though the species does swim in several lakes and rivers there.

Environmental problems

The carp is an invasive species. After years of reading about invasive mussels, spotted knapweed, leafy spurge, and the lake trout threatening native cutthroats in Yellowstone Lake, most Montanans now recognize the environmental peril that can follow the introduction of non-native plants and animals. In fairness to the carp, it's worth noting that many of the state's prized game fish

FOOD FOR THOUGHT Above: Though carp can be found in some of the cleanest waters of North America, including Lake Superior, they are a remarkably hardy fish able to survive in water far warmer and more polluted than most other species. This has led to their reputation as a "dirty" and thus unappetizing fish. Below: Yet in much of Europe and Asia, carp are raised as live prized livestock and revered for their culinary qualities.

species are not native to Montana either. Like carp, they were intentionally dumped in Treasure State lakes, rivers, and reservoirs—both legally and illegally, depending on the species and the water. The list includes brown trout, walleye, largemouth and smallmouth bass, and brook trout. One angler's invasive species can be another's favorite quarry.

Throughout much of the world, carp are a highly regarded food fish. Whole carp are still served at traditional Christmas dinners throughout Eastern Europe and parts of Germany and Austria.

Still, there's no denying the environmental problems caused by many non-natives, including carp. Fortunately, their preference for warmer temperatures keeps these whiskered fish away from headwaters inhabited by native trout and char. But in warmer waters, this highly productive species sometimes outcompetes other fish. "Any body of water can only support a given carrying capacity of biomass," says Jim Vashro, retired FWP regional fisheries manager in Kalispell, who for years tracked the spread of invasive fish species. "A thousand pounds more of carp eventually means a thousand pounds less of other fish."

Carp also degrade water quality, especially in shallow lakes and ponds. They feed mainly by rooting the bottom for insects, seeds, and vegetation. Disturbed sediment rises into the water column, making it difficult for sight-feeding fish like bass and northern pike to find prey. Suspended sediment also blocks sunlight from reaching aquatic plants like bulrushes and cattails used by waterfowl and other wildlife. Too many carp can turn a vibrant prairie pothole

CLOCKWISE FROM TOP LEFT: WILL PHELPS; JEREMIE HOLLMAN; JESS MCGLOTHLIN; SHUTTERSTOCK; SHUTTERSTOCK

into a bowl of muddy water.

One way carp spread these days is via bait buckets. Baby carp are often collected along with fatheads and other minnows. That's why Montana law makes it illegal to empty bait buckets in any Montana water or to bring bait into this state from another state or province.

In addition to the common carp, other carp species like the bighead, black, and silver are wreaking ecological havoc on waters west of the Mississippi River, but have yet, knock on wood, to appear in Montana.

Delicious to many, but not all

Throughout much of the world, carp are a highly regarded food fish. Gefilte fish, a poached mixture of ground deboned carp or other fish, is eaten in many Jewish households worldwide on holidays. Whole carp are served at traditional Christmas dinners throughout Eastern Europe and parts of Germany and Austria. *Larousse Gastronomique*, the bible of French cuisine, identifies carp as the "dish of kings" and provides multiple recipes for its preparation. So much carp is consumed in China and elsewhere in Asia that the species ranks as the world's most widely eaten freshwater fish.

In the late 19th and early 20th centuries, carp's culinary appeal was strong in the United States, too. But then attitudes here changed. One theory is that, because carp thrive even in warm, sewage-filled waters, their taste was degraded by the nation's increasingly polluted lakes and rivers. As water quality improved with passage of the Clean Water Act, the culinary appeal of carp in this country rose slightly, especially in Southern states.

I've cooked all kinds of wild-caught fish but have never found carp to my liking. The fish is laced with floating bones and can have a vague muddy flavor. People who like carp say the fish tastes best when taken from clean, cooler water. (Europeans bring a carp home from the fishmonger and let it swim in the bathtub for a few days to clean itself out.) They also note that scoring fillets allows hot cooking oil to penetrate the meat and disintegrate tiny bones, while larger ones can easily be picked from the meat. Several YouTube videos show how to fillet and prepare carp. The consensus among my friends who have learned to enjoy carp is that smoking offers the best means of making them palatable.

MONTANA "BONEFISHING" Carp will take a wide range of flies, including surface patterns like hoppers. But mostly they feed on lake and river bottoms, making crawfish, leech, and aquatic nymph patterns most productive. Below: Fly-fishing for carp is a lot like fishing bonefish flats in the Caribbean. Some anglers fish from boats, casting to feeding fish spotted with the help of polarized sunglasses. Others wade lake or reservoir "flats" and do the same.

Big and smart

Just as Europeans regard carp on the table more highly than we do, recreational anglers across the Atlantic have long endorsed Walton's "Queen of Rivers" designation. European anglers have developed complex, specialized techniques for catching carp, which are then carefully released to swim another day. There are carp fishing clubs, carp angling societies, and professional carp fishing circuits, not to mention countless books and magazine articles.

One reason for the carp's popularity is its size, especially after generations of selective breeding in Europe started to produce fish like the 100-pound world record, taken in 2019 from a pond in France. Adding to the species' appeal is its finicky nature. As fish go, carp are as smart as any brown trout, especially after being caught and released a few times. Carp anglers in Britain commonly fish for 48 or more hours straight through a weekend and thrill to catching a single fish.

American anglers have been catching carp for more than a century, but usually unintentionally while bait-fishing for game species. They often toss carp and other "rough fish" up onto the bank to suffocate under the misguided notion they are helping game fish. But over the past couple of decades, the carp's status has improved greatly. You can now join the American Carp Society or the Carp Anglers Group, subscribe to *North American Carp Angler* magazine, and hire carp fishing guides in every state, including Montana.

The appeal is the same as it is overseas, though North American carp don't grow quite as large. The Montana state record, for instance, is "only" a 40-pounder taken from Nelson Reservoir in 1998, but that's still a huge fish for anglers accustomed to 15-inch trout.

Fly rod anglers were slow to recognize carp's recreational potential, as was once the case with bonefish and redfish, which have now become saltwater glamour species. One reason is that carp suffered from a reputation as bottom feeders. In *The Compleat Angler*, Walton recommends chumming carp into casting range with "chicken guts and the like" and baiting hooks with pastes made from dead cats and similar unappealing substances. Tying chicken gut flies didn't sound all that appealing to fly anglers.

In fact, carp are omnivores that will eat almost anything, including foods that can be imitated by artificial flies: worms, nymphs, dragonflies, crayfish, leeches, grasshoppers, and minnows. Tom Dickson, the editor of this magazine and co-author of a book on rough fish angling, *Fishing for Buffalo,* says he has his best luck sight-fishing for carp then stripping a Woolly Bugger in front of their snouts. A friend from the Midwest recently sent me samples of his own favorite carp pattern: a dark chenille "dry fly" meant to imitate a floating mulberry. Carp feed on the purple berries in late summer as they fall off bankside bushes. We don't have many mulberries in Montana, but perhaps a chokecherry imitation would work.

In contrast to fly-fishing for trout, about which every possible technique already seems to have been analyzed to death, carp offer a new frontier, with plenty of room for imagination and innovation. That's one reason fishing for them is so much fun.

Many anglers who agree compete in the annual Bighorn River Alliance Carp Tournament based out of Fort Smith, southeast of Billings. (The tournament this year is July 9. Call 406-534-2915 for details.)

The only pricey item I wore was a good set of polarized sunglasses, one of the few necessities on a carp expedition.

"Then her reel started to whine..."

Back at Deadman's, Lori and I hiked about a mile of shoreline before we reached the shallow, weedy cove we planned to fish. Wearing an old surgical scrub shirt, cut-off jeans, and Crocs, I hardly looked like the stereotypical tricked-out fly-fisherman. The only pricey item I wore was a good set of polarized sunglasses, one of the few necessities on a carp expedition.

We immediately spotted carp tails dimpling the water's calm surface, a sight that

GETTING A SECOND LOOK Long disparaged by North American fishermen, carp are now gaining respect from anglers who appreciate the species' speed, power, and willingness (at times) to take a fly. As for the fish's appearance, beauty is in the eye of the carp-holder.

CLOCKWISE FROM LEFT: JOSHUA BERGAN; JOHN CHAFFEE; SHUTTERSTOCK

LUCKY CATCH Top: A fly angler hoists a trophy carp taken from Lake Helena. Carp are one of the few fish species that regularly take fly anglers into their backing. Below: Throughout Japan and China, people fly carp flags to bring good luck. Considering how challenging it can be to catch these finicky fish, that might be something for Montana carp anglers to consider.

brought back memories of "tailing" redfish on saltwater flats. As with redfish, tailing carp indicate fish feeding with their mouth down on the bottom. Ever the gentleman, I offered Lori the first shot at a nearby fish. She had rigged her rod with a Bead-Head Hare's Ear nymph, a pattern that had worked for me before. Unfortunately, the fish ignored what appeared to be a perfect presentation. Even experienced carp anglers can expect a lot of refusals.

"Try this," I suggested, handing her my rod, which had a large San Juan Worm attached to the tippet. She took a minute to study the fish's position as its tail bobbed up and down, then made another accurate cast. As she gave the worm a slight twitch, the fish accelerated toward the fly, leaving a broad wake in its path. Then her reel started to whine as the 10-pound fish, solidly hooked, bulled its way toward deeper water. It had been a long time since Lori had hooked a Montana fish capable of taking her into her backing, and we both thrilled at its power.

We landed and released another dozen carp weighing between 6 and 12 pounds before packing up and heading home. *Carpe diem* is Latin for "seize the day." I guess you could say what Lori and I did that afternoon, and anglers across Montana are doing more frequently, was *carpe carpium*—"seize the carp."

"SOLD!"

Big dollars for Montana's special auction tags produce major gains for big game management and habitat. *BY PJ DELHOMME*

When bidding at the moose license auction stopped in March 2015, a hunter had agreed to fork over $60,000 for a chance to hunt a bull moose in Montana that fall—the most ever paid to hunt the large-antlered ungulate in the Treasure State. Because there is no national group solely dedicated to moose conservation, the tag was auctioned by the next best thing: Ducks Unlimited.

Huh?

"We're a wetlands and waterfowl conservation organization," explains Barry Allen, senior regional director for Ducks Unlimited in Montana. "Moose need water and wetlands, just like ducks. Healthy wetlands provide habitat for moose and waterfowl."

Still, why was *any* conservation group able to auction off one of Montana's most coveted big game licenses?

Previously an editor at Bugle, *PJ DelHomme is a writer in Missoula.*

The answer dates to 1986, when the Montana Legislature authorized Montana Fish, Wildlife & Parks to create special trophy big game licenses to be auctioned to raise money for conserving those species. The first auction license was for a bighorn sheep, and over the next two decades lawmakers also authorized annual auction tags for moose, mule deer, elk, and mountain goats. Winning bidders may hunt in any open hunting district they choose, but they must abide by weapon and season restrictions.

The license auction idea grew from a paradox of wildlife management. Montana is home to relatively few bighorn sheep, moose, and mountain goats, meaning FWP can offer only a limited number of licenses each year and generate relatively little revenue from those sales. Because wildlife research, population monitoring, and habitat acquisition are done largely with license dollars, management of those high-profile species was getting shortchanged. Enter the auction licenses.

Since moose, wild sheep, mountain goat, and trophy elk and mule deer licenses are so coveted, annually auctioning one of each generates conservation funding far beyond that earned from sales of the handful of regular licenses. "We've been able to do things ranging from studying moose mortality to relocating bighorn sheep thanks to auction license revenue," says Ken McDonald, head of the FWP Wildlife Division.

McDonald adds that state statutes authorizing the auction licenses require the funding be used for the "substantial benefit" of each species. "It also must be used as *additional* funding for the species, not to replace existing funding," he says.

FWP isn't authorized to conduct auctions, so that work is done by conservation and sporting groups. In addition to DU's role managing the moose license auction, the Bozeman-based Wild Sheep Foundation holds the bighorn sheep auction, the Great Falls Chapter of Safari Club International auctions the mountain goat tag, Missoula-based Rocky Mountain Elk Foundation runs the trophy elk license bidding process, and the Mule Deer Foundation is responsible for the trophy mule deer tag.

Each year the Montana Fish and Wildlife Commission selects organizations to hold the auctions based on proposals that include how a group will promote their license auction.

"It gets down to the fact that there are far more hunters who want these licenses than we have licenses available."

LOW ODDS

To obtain an ordinary moose, sheep, goat, or trophy elk or mule deer license, hunters need to enter and then be drawn in yearly lotteries. Most hunters are never drawn, even after entering for decades. "It gets down to the fact that there are far more hunters who want these licenses than we have licenses available," says Neal Whitney, business analyst for the FWP License Bureau.

For instance, roughly 10,000 elk hunters put in for roughly 135 Elkhorn Mountains bull

PHOTO ILLUSTRATION BY LUKE DURAN/*MONTANA OUTDOORS*

licenses (HD 380) each year. For many mountain goat, wild sheep, and moose districts, the odds are less than 200:1.

With trophy big game licenses such a rare commodity, the idea that some people can buy their way to the head of the line by bidding tens or even hundreds of thousands of dollars for an auction license doesn't sit well with many hunters. "We hear people say that it turns hunting into a rich man's sport," Whitney says.

To ease some of that tension and allow hunters of modest means another chance, Montana created SuperTag licenses in 2006. SuperTag lottery tickets cost $5 each, and an individual may purchase an unlimited number of tickets. As with the auction licenses, lucky SuperTag winners in each species category receive a license to hunt in any hunting district in Montana—including Montana's legendary trophy districts. Since 2006, SuperTags have generated nearly $5 million in revenue, averaging roughly $330,000 each year. Unlike the auction license proceeds, which must go to the species for which each license is sold, revenue from SuperTag sales is earmarked for hunting access and FWP law enforcement.

MONEY FOR CONSERVATION

There's no denying the auction license system works as envisioned. Yes, tags go to some very rich people. For instance, this past January at the National Wild Sheep Show in Reno, Nevada, the Wild Sheep Foundation sold the Montana auction tag for $440,000 to a Malaysian sultan. And, for each species, that's one fewer trophy license available to people of lesser means.

But all that money ends up creating more habitat for big game animals and improving FWP research and monitoring work. Since inception, the bighorn auction license has generated more than $7.6 million, the moose license more than $600,000, the mountain goat tag $345,000, the trophy elk tag $550,000, and the trophy mule deer license over $335,000. "That's money we wouldn't have had if not for the auction tags," says McDonald.

"Those projects aren't cheap. Capturing and disease surveillance, especially, are really expensive."

By law, 90 percent or more of the proceeds from each auction tag must go to conserve that particular species. The auctioning conservation group gets to keep 10 percent, but even that must be used for auction expenses and advertising, says Whitney.

Take wild sheep, for instance. Over the past several decades, populations have been on a roller coaster ride, and everyone wants answers. But when it comes to wildlife management, coming up with answers is costly.

"You bet that money is important for the sake of the sheep," says Kurt Alt, conservation director for the Wild Sheep Foundation. He says the money is used by FWP to conduct research, augment or restore bighorn sheep populations, help fund conservation easements, and enhance habitat. "Those projects aren't cheap," adds Alt. "Capturing and disease surveillance, especially, are really expensive."

Buying habitat is also pricey, especially with Montana's ever-booming real estate market. Allen, the DU Montana senior regional director, says his group is grateful for the moose auction license because it helps FWP acquire wetlands. "Wetlands have many benefits, from water purification to flood control to wildlife habitat," he says. "Whether it's conserved as 'moose habitat' or as 'waterfowl habitat' doesn't matter to us. We just want to see more wetlands conserved."

Editor's Note: Montana state statutes also allow for auctioning a grizzly bear license, if hunting is someday allowed. Funds would be dedicated to grizzly bear management. "It costs a lot to conduct grizzly bear research, monitor movement, and reduce conflicts between bears and people," says McDonald. "An auction license could be an important source of funding for that work, which has helped maintain the largest grizzly population in the Lower 48 while minimizing conflicts."

Auction funds in action

License auctions have generated essential additional funding for wildlife management across Montana, Ken McDonald, head of the FWP Wildlife Division, says. "For instance, when chronic wasting disease was first detected, we were able to leverage deer auction dollars with federal Pittman-Robertson dollars to carry out an immediate response," he says.

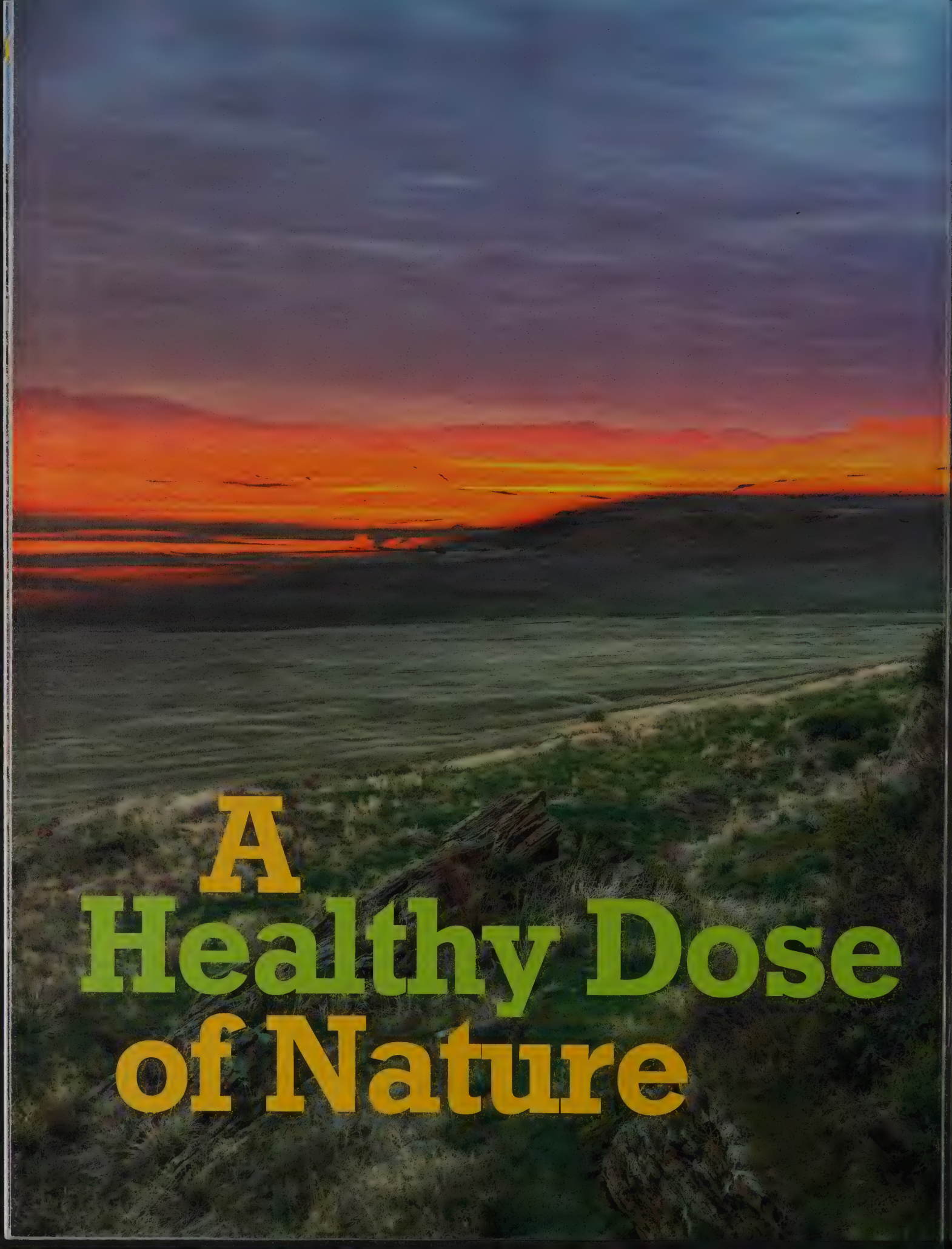
FWP has used mountain goat and bighorn sheep auction dollars to intensively study diseases in those species, and conduct ground surveys to help verify the accuracy of standard aerial surveys.

"We've also used elk auction dollars to purchase a portable ultrasound machine so our biologists could, with less stress on the animals, assess the body condition of elk they capture as part of various field studies," McDonald says.

To benefit bighorn sheep habitat, auction license proceeds helped purchase the 11,200-acre Lone Tree Conservation Easement near Chinook and the 4,424-acre Whiskey Ridge Conservation Easement near Winifred, acquire a 296-acre addition to the Blue-eyed Nellie Wildlife Management Area (WMA) near Anaconda, purchase the 440-acre Full Curl WMA along the Flathead River, and buy a 52-acre parcel near Thompson Falls that includes a bighorn sheep viewing site on Montana Highway 200. Deer and elk auction funds were recently used to help acquire the 3,980-acre Rumney Foothills Conservation Easement near Cascade, and deer auction funds helped buy an 80-acre inholding of the Beckman WMA near Lewistown. ■

Translocating bighorn sheep using auction license funding.

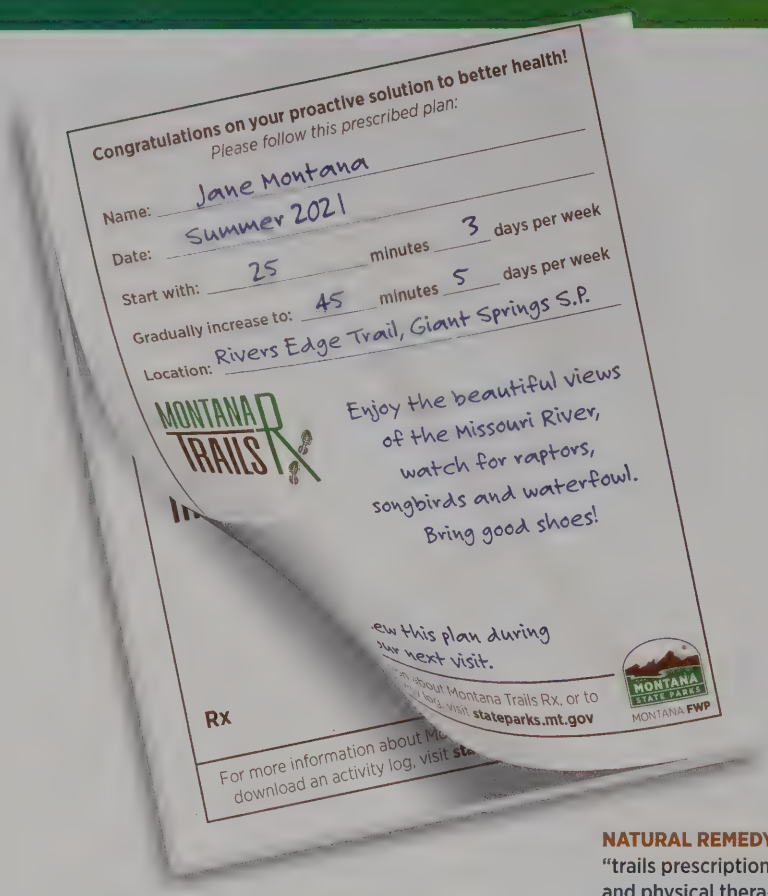
ERIK PETERSEN


A
Healthy Dose
of Nature

Hiking, fishing, bird watching, and otherwise enjoying Montana's parks, trails, and other public lands can improve our physical and mental well-being. **By Julie Lue**

FEELING GREAT. A hiker takes in the stunning sunset view from the bluff at First Peoples Buffalo Jump State Park.

PHOTO BY ANDY AUSTIN


Congratulations on your proactive solution to better health!
Please follow this prescribed plan:
Name: Jane Montana
Date: Summer 2021
Start with: 25 minutes 3 days per week
Gradually increase to: 45 minutes 5 days per week
Location: Rivers Edge Trail, Giant Springs S.P.
MONTANA TRAILS Rx
Enjoy the beautiful views of the Missouri River, watch for raptors, songbirds and waterfowl. Bring good shoes!
Rx
MONTANA STATE PARKS
MONTANA FWP

NATURAL REMEDY FWP offers these "trails prescription" pads to doctors and physical therapists to prescribe outdoor exercise to their patients.

I haven't brought my fly rod, but a rising trout still draws me to the water on the south side of an island in the Clark Fork River. Upstream, a family of eared grebes paddles in the current. Downstream, an osprey chirps loudly from its perch on a dead branch, then takes flight and circles overhead. Several cottonwoods lie across the bank, their trunks gnawed through by beavers. The air is filled with the rush and gurgle of the river, and the beeping of what sounds like a thousand nuthatches in the riparian forest behind me. I can smell the damp sand beneath my feet, the wild mint growing between the cobbles.

Except for the view over my left shoulder—distant buildings and a jet rising steeply after takeoff—you'd never guess I'm just a short drive and a short walk from one of Missoula's busiest commercial strips.

Today I've taken a break from my errands to explore Council Grove State Park, site of the signing of the 1855 Hellgate Treaty between the Salish, Kootenai, and Kalispel tribes and the federal government. The park is a peaceful place to walk among old-growth ponderosas and reflect on how, 166 years ago, the three tribes reluctantly ceded ownership of most of their homeland while retaining key rights for cultural and subsistence uses of these lands.

It also provides an opportunity for exercise, fresh air, and a connection with the natural world—something appreciated not only by walkers, bird watchers, and other recreational users, but also by scientists and healthcare providers. A growing body of research supports what those who love the natural world have suspected all along: Spending time in nature and participating in outdoor activities is good for our physical and mental health.

Healthier outside

For decades, health officials have recommended exercise to help build strong bodies and healthy hearts, and many Montanans heed the call. Montana ranks "near the top of the heap" compared to other states regarding physical activity and obesity, according to Dr. Aaron Wernham, a family physician and CEO of the Montana Healthcare Foundation in Bozeman. But we're still "not where we want to be," Wernham says. According to Montana's Department of Health and Human Services, more than 60 percent of Montana adults live with chronic diseases, for which lack of physical activity is a risk factor.

The state's healthcare picture includes both good and bad news. Although Montana has a robust network of primary care, hospital care, and behavioral health centers, according to Wernham, much of the state suffers shortages of healthcare staff and facilities, requiring many rural residents to drive long distances to see providers.

Yet medical facilities alone can't ensure good health, Wernham says. "We are sometimes conditioned to think that access to health care makes you healthy, but having

CLOCKWISE FROM TOP LEFT: PHOTO ILLUSTRATION BY LUKE DURAN/*MONTANA OUTDOORS*; KEVIN LEAGUE; ANDY AUSTIN; ANDY AUSTIN

Hiking at Council Grove State Park along the Clark Fork River. It's one of dozens of Montana state parks accessible for hiking or just sitting along a stream or lake listening to the water.

Many Montanans already enjoy the benefits, even if unintentionally, of "forest bathing" or "forest therapy." Known as *shinrin-yoku* in Japan, this practice involves walking or relaxing in the woods while engaging all the senses.

Spring Meadow Lake State Park, top, and Frenchtown Lake State Park, above.

access to activities that keep you healthy is what makes you healthy. Our health has more to do with how we live our lives."

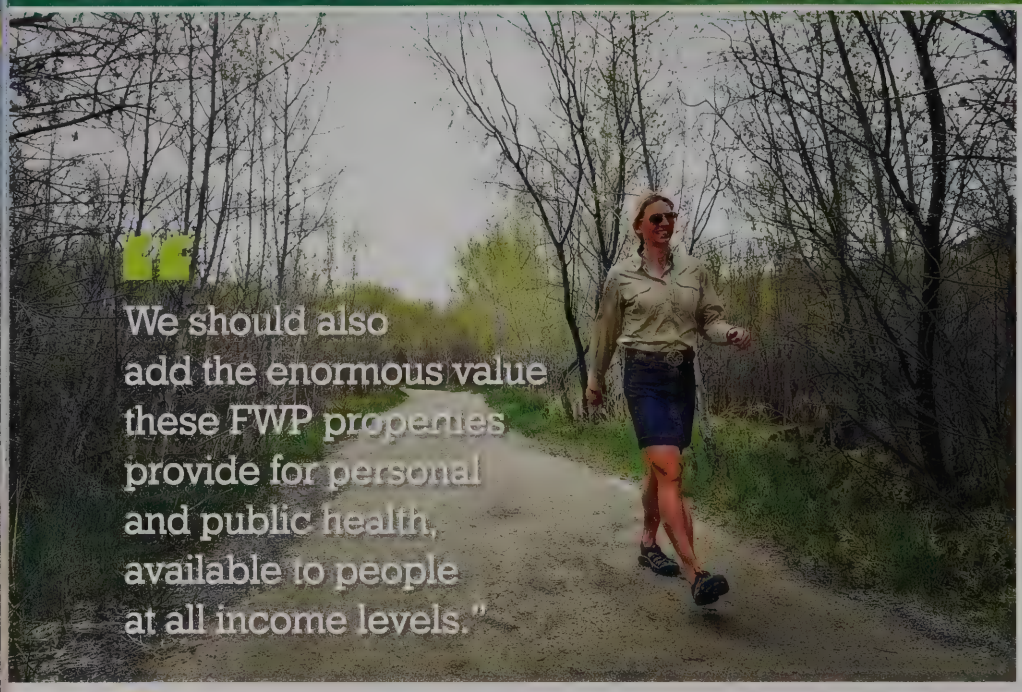
And if our lives include plenty of activities in nature, even better. Wernham says access to parks and open space is associated with lower rates of diabetes, high blood pressure, depression, and anxiety. "There's enough [research] to convince me as a medical professional that the benefits are significant for physical and mental health."

Montana State Parks chief Beth Shumate says hundreds of studies affirm this connection between nature and health. "There's so much research out there showing that we can decrease the burden of chronic disease with time spent outdoors," she says. Shumate, who previously coordinated the Montana State Parks Trails Program and before that worked in public health at Mayo Clinic in Minnesota, believes that lands managed by FWP play an important role in keeping Montanans healthy. "Right now, we talk about our state parks, wildlife management areas, and fishing access sites in terms of recreation, access, stewardship, education, and, most recently, value to local economies," Shumate says. "But we should also add the enormous value these properties provide for personal and public health, available to people at all income levels."

Natural remedies

Many people already use these areas regularly for health reasons, often walking or hiking on trails. Shumate says health benefits also come from outdoor activities not traditionally viewed as exercise, like camping,

Julie Lue is a writer in Florence.


We should also add the enormous value these FWP properties provide for personal and public health, available to people at all income levels."

HEALTH ADVOCATE Beth Shumate unwinds after work at Spring Meadow Lake State Park. The Montana State Parks chief believes state parks act as "health centers" that provide accessible sites where people can de-stress, build strength, and rejuvenate.

wildlife viewing, fishing, and snowmobiling (which, according to researchers at the University of Guelph in Ontario, qualifies as a moderate-intensity activity). "There's exercise just in loading and unloading your snowmobile from the trailer, or getting a walleye boat in and out of the water," Shumate says. "It's movement, it's activity, and it's all good for you."

What's more, time spent outdoors appears to have what health specialists call a "dose curve." Researchers have learned that, for instance, 5 minutes outside is beneficial, "but 30 minutes to an hour is *really* beneficial, especially for helping reduce anxiety and depression and increase vitality and creativity," Shumate says.

Body and mind

Benefits of outdoor recreation in nature extend beyond exertion alone—perhaps due to "biophilia," a term used by Harvard biologist E.O. Wilson to describe our "innate tendency to focus on life and lifelike processes."

Walking along a busy street or on a gym treadmill doesn't make us feel as good as strolling through a forest or even a wooded urban park. According to researchers with the Walking Green Project (a joint effort by Northwestern University and the University of Minnesota), "activity in greenspace yields greater improvements in mental health than does activity completed indoors or in a built urban environment."

Studies show that time spent in nature is linked to reduced levels of the stress hormone cortisol, lower heart rate and blood pressure, and decreased activity in a part of our brains linked to rumination, or excessive worrying. It can also improve our sense of well-being, help us focus better, and contribute to recovery after stress, even trauma.

Many Montanans already enjoy the benefits, even if unintentionally, of "forest bathing" or "forest therapy." Known as *shinrin-yoku* in Japan, this practice involves walking or relaxing in the woods while engaging all the senses. It's not unlike my morning at Council Grove, or what you might experience when out hiking, fishing, mountain biking, or hunting. You see the sunlight filtering through the trees, hear the sound of water, feel the wind on your face, and smell the fresh air. Forest therapy has been shown to reduce stress and improve mood and sleep. There is also evidence that phytoncides—volatile organic compounds released into the air by trees—don't just make forests smell good, they also boost our immune systems.

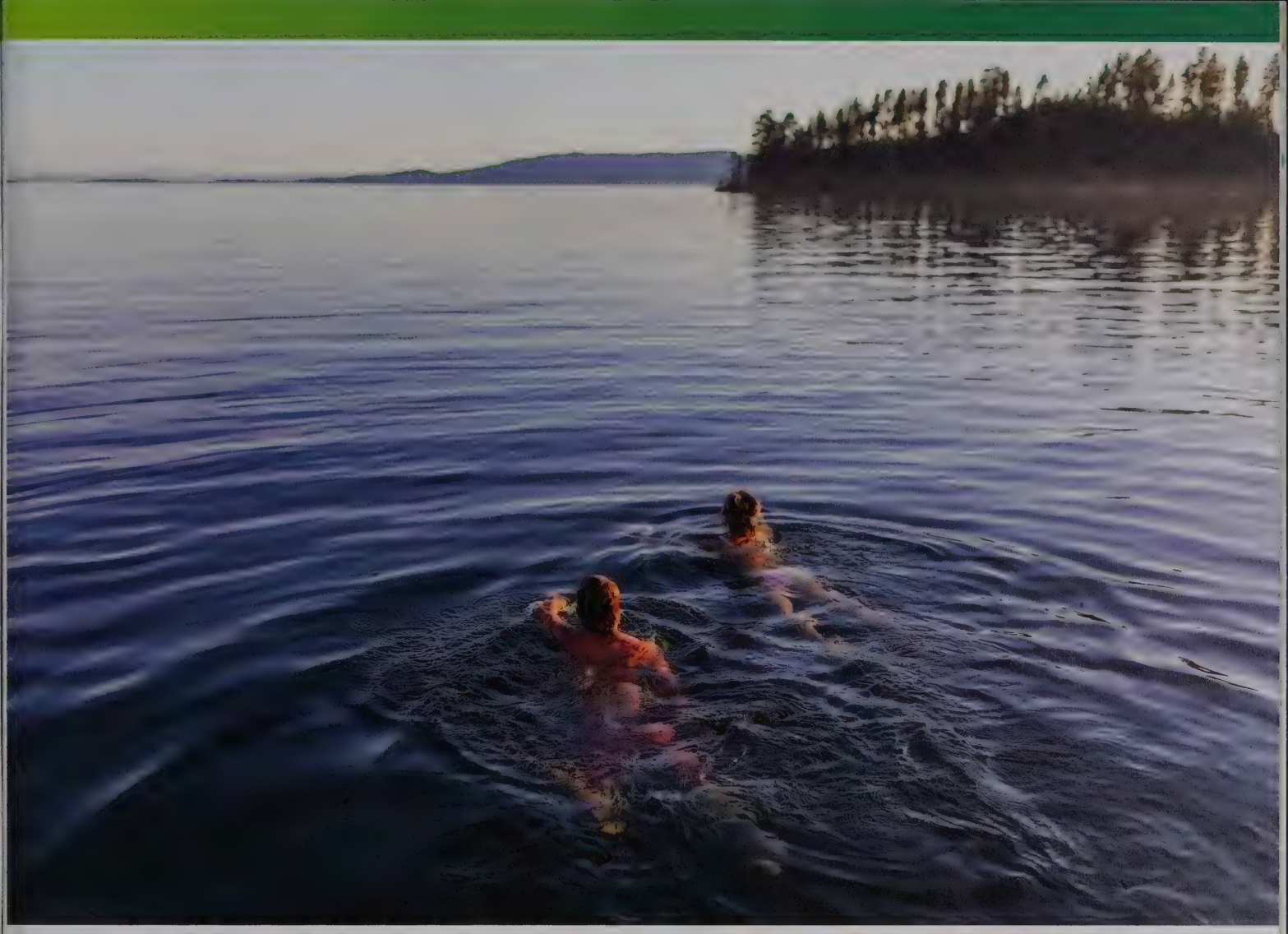
But you don't need a forest for a healthy nature break. Spend time along a river, in a prairie, or on a lake or mountain. And the places that make the biggest difference are probably those close and convenient enough to become part of your everyday life. They may even be right where you live.

Local trails

Most Montana major municipalities—including Billings, Bozeman, Butte, Helena, Missoula, Great Falls, and Whitefish—have extensive paved and natural trail systems available for people to take in a regular dose of "vitamin N" (nature). Then there's

TOP TO BOTTOM: THOM BRIDGE; STEVEN GNAM

WHEELING FOR WELLNESS A young mountain biker followed by her dad heads down the Whitefish Trail, one of several community-supported trail systems across Montana.



YEAR-ROUND OUTDOOR ACTIVITY
Above: Swimmers rejuvenate at Yellow Bay State Park on Flathead Lake. Below: New research shows that snowmobiling and power boating, not usually considered exercise, provide health benefits by getting people moving outdoors.

TOP TO BOTTOM: ANDY AUSTIN; SHUTTERSTOCK

Studies show that time spent in nature is linked to lower blood pressure and decreased activity in a part of our brains linked to rumination, or excessive worry. It can also improve our sense of well-being.

Montana's state parks, many within city limits or a short drive from communities across the state.

State parks offer so many health benefits that Shumate thinks people should start considering them as "health centers." Though state parks are diverse, ranging from primitive sites to amenity-rich tourism hot spots, all offer visitors the chance to get outside and get moving—whether by walking, swimming, mountain biking, or kayaking. "We have the infrastructure of trails, signs, restrooms, parking, and all other parts of the 'built environment' that make trail use easy and convenient for visitors," Shumate says. And many people make state parks part of their regular routine.

At Lone Pine State Park near Kalispell, known for its spectacular views of the Flathead Valley, local hikers regularly traverse parts or all of the 7.5-mile trail system, informing park manager Brian Schwartz of any downed trees or other problems they encounter. Murray Jewett, who describes himself as "the youngest 64-year-old you're ever going to meet," walks there at 5:30 every morning with his wife, Melinda Cole, and their two dogs. During winter they keep going with the help of headlamps, reflective vests, and traction devices. Jewett says these walks give him "a daily dose of exercise and fresh air that acts as my sunlight substitute" on dark days. Besides the physical advantages, walking in the park is a "huge destressor," he adds. "There's nothing more meditative than a walk in the woods."

Sunnie Paulson, who has Type 1 diabetes and cares for her grandchildren during the

GOOD LANDS Hikers take in a healthy prescription of stunning scenery on the Cap Rock Trail at Makoshika.

Montana's largest state park serves as a destination for travelers attracted by paleontology and beautifully tinted badlands formations. Makoshika also provides an everyday escape for residents of Glendive, just minutes away.

day, walks in Lone Pine State Park nearly every morning, both for the exercise but also because "sometimes that's the only time I get out of the house," she says. "Since we moved here and we found this park, it has been my place."

Big backyard

On the other end of the state, Montana's largest state park, Makoshika, is a destination for travelers attracted by paleontology and beautifully tinted badlands formations. It also provides an everyday escape for residents of Glendive, just minutes away. Park manager Chris Dantic says Makoshika's almost 20 miles of trails draw regular hikers as well as local high school and community college cross-country teams.

Glendive dentist Luke Gambee visits Makoshika three or four times a week, often biking or running there after work. "If I squeeze in at least a quick loop before I go home, I feel good," he says. He and his wife Meghann and their five children often visit the park together to bike, hike, or just play. "We have a small backyard, but it feels big because the park is right there," says Gambee, who likens the family's time in the park to "an emotional and mental vitamin supplement."

Montana State Parks and Recreation Board member Kathy McLane, who lives on a large ranch near Makoshika, says that even with 20,000 acres of their own rangeland to explore, she and her family often visit the park. McLane, honored as a "community champion" by the Dawson County Healthy Communities Coalition, believes that people "need to breathe air that hasn't been breathed yet; that's important for our health."

McLane, an avid hiker and horseback rider, also likes to take her 95-year-old mother riding in a side-by-side utility vehicle. "It makes her feel like she's a part of the world," McLane says.

A dose of nature

Lake Elmo State Park, which protects 123 acres of water and greenspace in the center

TOWN TONIC Located within the Billings city limits, Lake Elmo State Park's trails and lake are an easily accessible nature fix for the urban area's 110,000 residents.

TOP TO BOTTOM: DIANE BROWDER; ANDY AUSTIN

GETTING THEIR DAILY DOSE Above: Paddleboarders cross Brush Lake, Montana's easternmost state park, located about 65 miles north of Sydney. Top right: Walking the shoreline at Ackley Lake State Park, another little-known park, located east of Lewistown.

But you don't need a forest for a healthy nature break. Spend time along a river, in a prairie, or on a lake or mountain.

of Billings, is another natural "health club" for local residents. In 2020 the park received about 230,000 visitors, including many like Diane Svee, who walks the crushed gravel trail around the lake once or twice a week. During the initial pandemic stay-at-home order, "it made all the difference in my mental health to be able to go outside," she says.

On a typical summer day, the park is in use from opening time at 5 a.m. until closing at 10 p.m. Runners head out early with their dogs on the 1.4-mile loop trail. As the day warms, the park attracts even more runners, families with small children, kayakers and paddleboarders, swimmers, and, at dusk, sunset-watchers.

FWP south-central region park manager Terri Walters hopes to connect additional Billings residents with Lake Elmo State Park through FWP's "Prescription Trails" Program, which encourages healthcare providers to "prescribe" trail use at Lake Elmo. Sometimes people don't know where to go, Walters says, but trails prescriptions identify "a place that is very accessible and safe within city limits where they can recreate and exercise." This low-key program requires only trail signs, a brochure, prescription pads (see page 24), and outreach—from Walters, physical therapists, and even veterinarians.

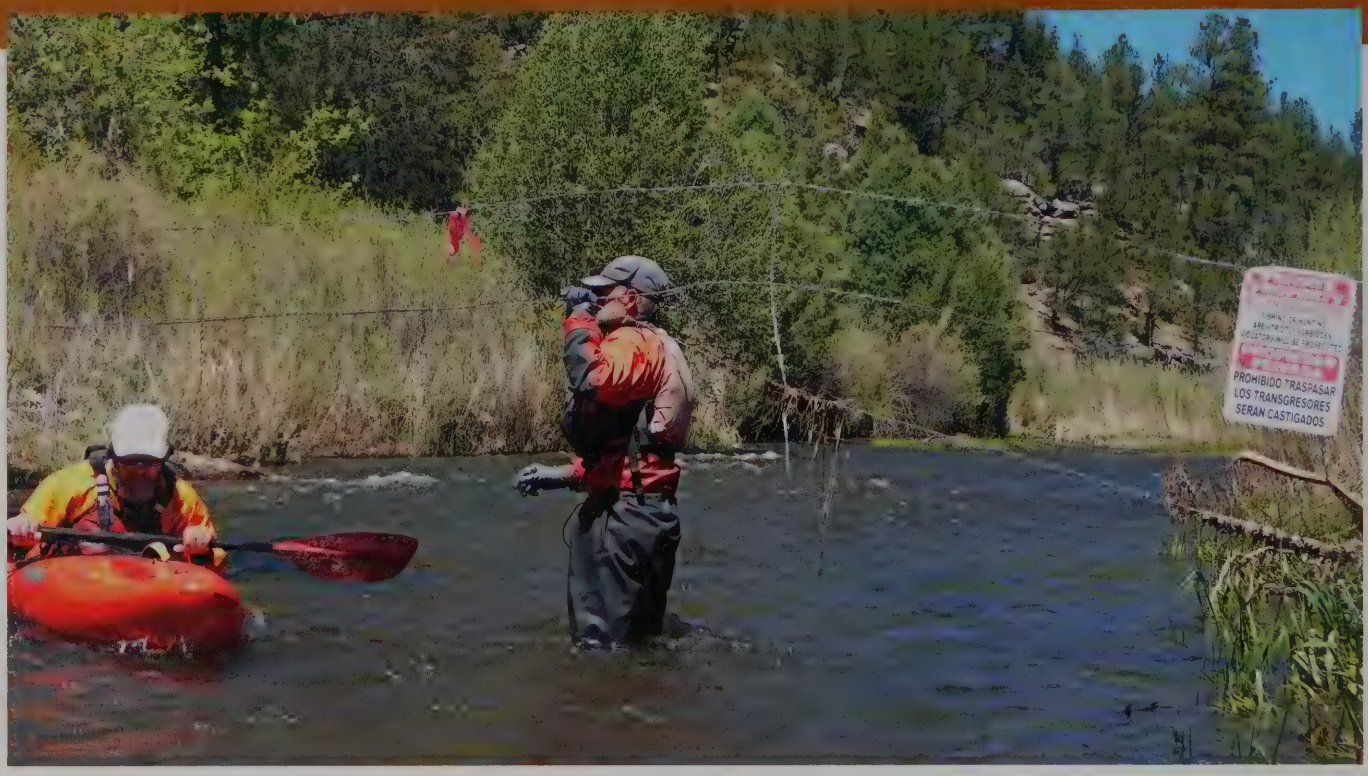
A unique element of the FWP program is asking veterinarians to consider prescribing Lake Elmo's trail for dogs that need more exercise, benefiting both pets and owners. "Many people are much more willing to do things for their dog than they are for themselves," Walters says.

Walters recognizes the importance of the Lake Elmo trail to the surrounding community and hopes grants can help FWP eventually pave the 1.4-mile loop. She also aims to establish prescription trails at nearby Cooney and Plenty Coups state parks.

Not surprisingly, Shumate would like to expand the prescription trails concept even further to include more state parks, as well as fishing access sites, wildlife management areas, and community-owned urban trails. "As healthy as many people are in Montana, we still face unhealthy rates of heart disease, diabetes, depression, obesity, and suicide," she says. "Just getting outdoors can be a big part of preventing these health problems."

PET SMART Taking dogs for a walk, like on the Whitefish Trail outside of Whitefish, can be just as healthy for pet owners as it is for their pets.

CLOCKWISE FROM TOP LEFT: ANDY AUSTIN; ANDY AUSTIN; WHITEFISH LEGACY PARTNERS



LEGAL OBSTACLE A paddler holds up a barbed-wire fence crossing a New Mexico river so his partner can pass under. In many western states, including Montana, it is legal for landowners to fence rivers, though it's rarely done here out of courtesy to floaters and because fences blow out in high water.

Seeking Calm Waters

Navigating a legal and respectful route through private and public rights on a Montana river. By Kathy Heffernan

The landowner was furious. She questioned our authentic Montana origins and admonished us "town people" to get off her property. Stunned, we retreated down the dusty ranch road toward the river. Her husband caught up to us in his pickup. He was calm and civil, but unsympathetic. He looked tired. Perhaps tired of the parched summer that rolled into a smoky autumn, tired of coaxing hay from his dry fields, and tired of us—floaters who got caught in his barbed-wire fence across the river—interrupting his day.

Kathy Heffernan is a retired special-education and science teacher in Missoula.

Our misadventure had started a few miles upstream in a rock-strewn canyon on a blue-sky morning. We four 50-something adults launched our kayaks and canoes from a public access site into the cool, shallow waters of our favorite river, abandoning house chores for a relaxing river weekend. After navigating miles of cascading waters tumbling over rocky reefs and eddying into deep pools, we rolled out onto broad prairie ranch lands lined with yellowing cottonwoods, some of them topped with eagles. The sun was low behind us when we spotted fence posts in the shallow river ahead. Within 20 feet, we detected barbed wire. We scanned the obstruction, looking for a float gate or breach that would allow us to pass safely downstream.

In the lead, John got out of his kayak, tripped, fell, and grabbed for the fence. "It's hot!" he yelled, dropping boat and gear at the shocking surprise delivered by the electrified wire. We were all out of our boats now, staring up and down the fence, looking for the opening that was not there. The fence on its metal posts marched across the river, impenetrable from shore to shore and into cottonwoods and willows on both sides. We pried the lowest wire with paddles and pushed our boats under, gingerly sliding under the electric wires ourselves. Andrea caught her paddle against the unforgiving wire and received a jolt of electricity. Paul was chasing lost gear in his kayak. John waited in his torn swimsuit, bleeding from gashes in his forearm and thigh.

We were certain that someone had mistakenly blocked our passage and a simple conversation would clear up the misunderstanding. Andrea and I headed up to the nearby ranch house to ask about the fence. At this point, we were technically trespassing, but we felt our mission was justified.

The eventual explanation was less than

CLOCKWISE FROM TOP LEFT: SCOTT CARPENTER; KATHY HEFFERNAN; SCOTT CARPENTER

we had hoped. The rancher didn't think anyone floated the river that time of year. He had to keep his cows in. He couldn't make everyone happy. He didn't think the electricity was strong enough to hurt a person much.

We were tired, too. We wearily loaded ourselves into our canoe and kayaks, determined to put the unfortunate incident behind us. The river sang beneath us as we carried on downstream to a gravel bar under comforting cottonwoods, where we camped. We woke to the melancholy notes of a coyote choir and another clear morning. A sunlit day and many satisfying river miles later, we tied our boats onto our truck, drove into a friendly little town for ice cream, and joked about the disastrous fence.

WATER FOR ALL The author on a September afternoon: "Most angst between landowners and floaters can be avoided with an understanding of Montana's Stream Access Law," she writes.

KNOWING THE LAW

As regrettable as our interactions that Saturday were, most angst between landowners and floaters can be avoided with an understanding of Montana's Stream Access Law. Our small boating party had misconceptions that fueled this disagreement. The angry landowner launched into her tirade when I called her fence "illegal." In fact, it was not illegal. With very little effort, I later learned that Montana's Stream Access Law does not outlaw fences across rivers, though landowners must allow, but are not required to facilitate, floaters' access through or around such fences.

UP AND AROUND In Montana, boaters may go onto land even above the high-water mark to bypass fences crossing streams and rivers.

Since 1985, and after several court challenges, the Stream Access Law allows recreational access along the beds of rivers and streams. A person may access any Montana stream or river capable of recreational use from public water access sites, road bridges, public land, or private property with the landowner's permission. Once on the water, a person may wade, boat, and walk along the shoreline below the normal high-water mark. A person cannot venture up onto the floodplain, camp above the high-water mark, drive an ATV in the river, or do anything not directly related to water recreation without landowner permission.

The Stream Access Law also does not permit camping along a stream or river "unless it is necessary for the enjoyment of the surface water." Also, the campsite "must be out of the sight of a dwelling or more than 500 yards from any occupied dwelling (whichever is less)." Landowners can legally put a fence across a river, even electrified, to either contain livestock or delineate property boundaries. State law allows floaters, if necessary, to portage their craft on private land above the high-water mark to get around the barrier. A portage around that electrified fence would have proved challenging for us, but that is the law.

PROTECTING RIGHTS

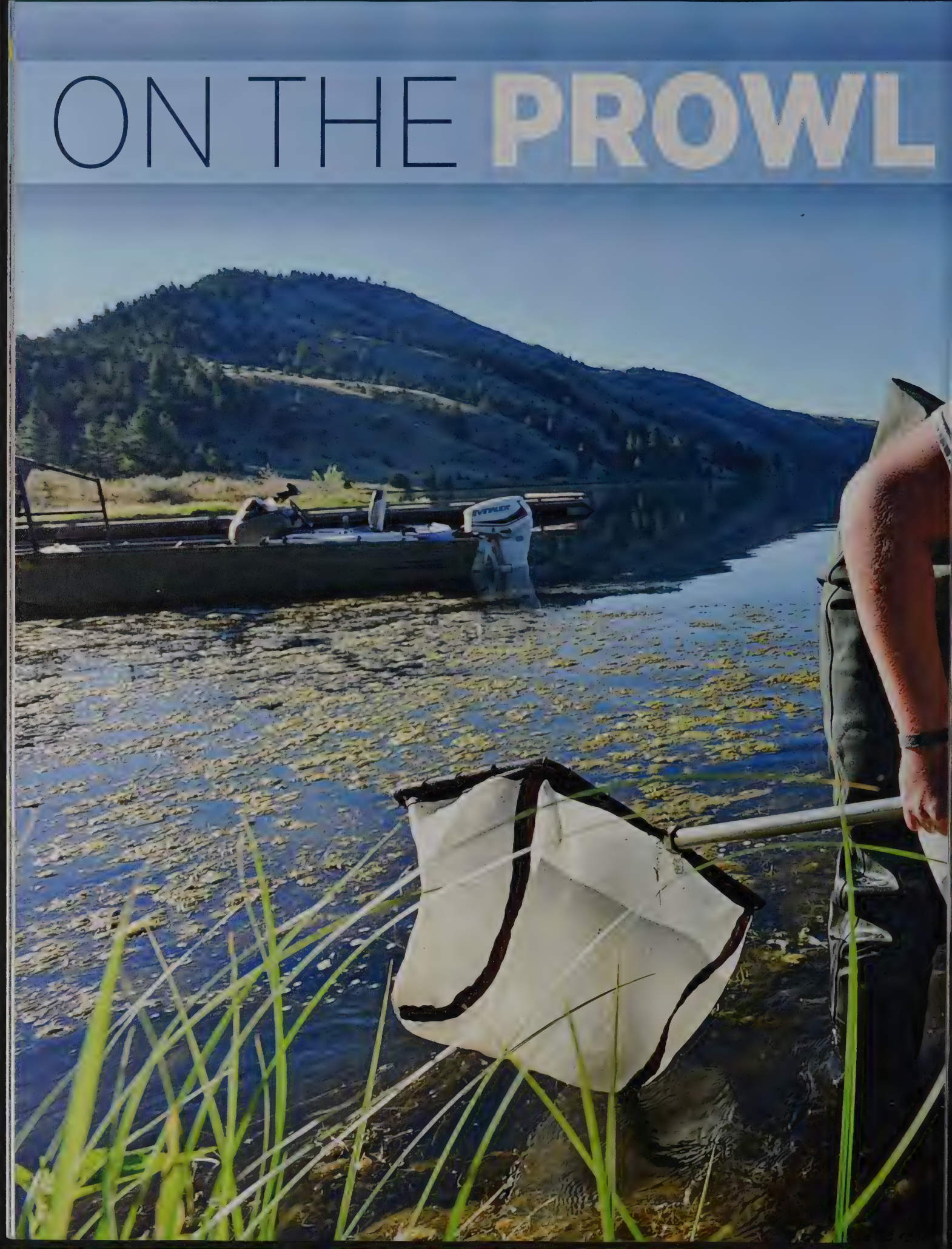
I am glad this ranching couple protect their private land and property rights as fiercely as many of us protect public rivers and access rights. They preserve the honorable, hard-working traditions of Montana ranching. I would not take away their fence or their land or their cattle. I just want access to our beautiful, free-flowing rivers. I hope someday they add a float gate to their stream fence, an oversized wind-chime-like structure of PVC pipe that allows floaters to pass through unscathed. However, Montana law does not require ranchers to put up float gates, so the choice is theirs.

I treasure the river access that Montana's Stream Access Law provides floaters. In addition to obeying that law, my husband, friends, and I try to act as good river citizens. We carry out all our trash. If we find cans in someone else's fire ring or trash in the willows, we pick that up, too. We drown our campfire until the ash is swimming, then stir it like a blackened stew. When on the river or in camp, we are quiet—out of respect for any nearby landowners or other river users.

For us, a river is a sacred place. We have floated this river for many years, and we will return every year until old age forces us out of our canoes and kayaks. We treasure its crystal waters, lonely vistas, and abundant wildlife as it tumbles along.

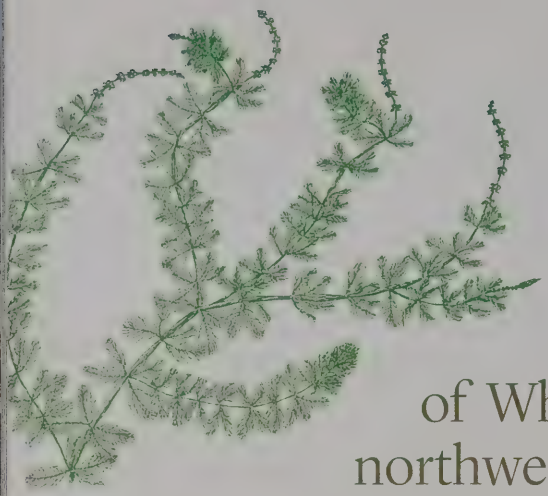
Ranchers, anglers, and floaters: It takes all of us to protect our rivers. When we obey state laws and otherwise assume the responsibilities of stewardship, our rivers will provide for us all.

ON THE PROWL



How FWP crews, partner organizations, volunteers, anglers, boaters, and others search for aquatic invasive species to help prevent their spread. BY TOM DICKSON

ROCK HOUND Brian Hagan, AIS monitoring technician, checks a rock in Hauser Reservoir near Helena for invasive snails. Hagan holds a kick net he uses to sample shallow shoreline areas for aquatic beetles, insect larvae, and other small organisms. PHOTO BY THOM BRIDGE



Alicia Stickney stood on the shore of Beaver Lake, a few miles west of Whitefish Lake in northwestern Montana, and noticed something strange.

It was fall of 2011, and Stickney, a Montana Department of Natural Resources & Conservation environmental scientist, was on a work field trip. "I saw these strange plants washing up on shore," she says. "I picked some up and thought, 'Gosh, this has a lot of leaflets. I think it's Eurasian watermilfoil.'"

Sure enough, experts with Montana Fish, Wildlife & Parks soon verified that the vegetation was one of the nation's most dreaded non-native plants. Easily confused with the native northern watermilfoil, Eurasian watermilfoil quickly spreads and forms thick mats that carpet lakes and reservoirs. The dense vegetation clogs irrigation pipes and canals, blocks boating lanes, and crowds out swimmers. Infestations can cause lakeside property values to plummet.

The discovery was especially concerning because Beaver Lake is connected by a creek to Whitefish Lake, one of the most popular recreation waters in northwestern Montana.

After Stickney's discovery, the Whitefish Lake Institute, city of Whitefish, and several state agencies quickly deployed crews to kill the largest patches. Afterward, scuba divers used underwater vacuums to suck the plants up by their roots to prevent leaves from fragmenting, spreading, and taking root. Crews also installed a sediment barrier to block milfoil growth and prevent fragments from drifting downstream to Whitefish Lake.

"Our efforts at Beaver Lake have been a success, when few success stories exist with Eurasian watermilfoil invasions," says Mike Koopal, executive director of the Whitefish Lake Institute. Koopal is optimistic that the non-native milfoil can be completely controlled and kept out of Whitefish Lake, "but there's no way that would be possible if we hadn't had a chance to jump on it early, before it was able to spread," he says.

Craig McLane, Aquatic Invasive Species (AIS) Early Detection and Monitoring Program coordinator for FWP, says Beaver Lake exemplifies how early detection can keep invasive species at bay. "Compare that to Noxon Rapids and Cabinet Gorge [reservoirs], where they discovered Eurasian watermilfoil much too late," he says.

McLane explains that the rapidly spreading plant, first discovered in the two lower Clark Fork River impoundments in 2007, quickly filled bays and surrounded docks. The plant likely arrived on boats from nearby Idaho, where it had been discovered a few years earlier. Noxon homeowner Richard Reich told the *Missoulian* the weeds were so thick they clogged his boat's propeller and made it impossible for his kids to swim off the dock.

"All we can do now is try to keep it under control with herbicides and harvesting, but there's no way we'll ever get rid of it entirely," McLane says.

VACUUM PICKED A scuba diver uses the DASH method (diver-assisted suction harvest) to remove Eurasian watermilfoil. Vacuuming the invasive species prevents fragments from escaping and reestablishing elsewhere in lakes or reservoirs

RESPONDING TO A MAJOR THREAT

Even worse non-indigenous aquatic plants and animals threaten Montana waters. Most dreaded are invasive mussels (zebra and quagga), which spread at astonishing rates, reaching densities of 700,000 per square meter. The thumbnail-size crustaceans quickly blanket marina piers, jam boat engines, clog irrigation pipes, and disrupt hydropower plant equipment. After they overpopulate and die, the bivalves foul beaches with a putrid stench and razor-sharp shells. In other states, invasive mussels have ravaged aquatic ecosystems.

"Ecologically, most invasives are a disaster," says Stacy Schmidt, an FWP environmental scientist. Eurasian watermilfoil muscles out native vegetation, invasive clams and mussels displace native crustaceans and strip water of nutrients needed by fish and aquatic insects, and some invasive species carry parasites deadly to birds. "Then there are impacts we don't even know about," Schmidt says. "These species are scary to anyone who cares about Montana's ecological health."

Scary also to anyone who cares about the state's economic health. In the Great Lakes region, invasive zebra mussels have cost states, cities, and industries tens of billions of dollars to repair damaged power plants, retool municipal water facilities, and unclog irrigation systems.

WISCONSIN AND AND WATER CONSERVATION ASSOCIATION

ON HER RADAR Alicia Stickney, of Helena, holds a clump of Eurasian watermilfoil similar to the specimen she identified at Beaver Lake near Whitefish in 2011. The astute observation allowed crews to jump on the infestation early and prevent it from spreading to nearby Whitefish Lake.

THOM BRIDGE

Outlays like that caught Montana elected officials' attention. In 2017, after invasive mussel larvae were detected at Tiber Reservoir near Shelby, and another infestation was strongly suspected at Canyon Ferry Reservoir, the Montana Legislature appropriated $6 million per year to aid state AIS efforts, chiefly through FWP programs.

THE AIS OFFENSE

Most aquatic invasive species in North America originated in the ballast water of ocean-going ships entering the Great Lakes from Europe and Asia. From there they spread mainly by clinging to boats, kayaks, canoes, and wading boots. AIS also enter lakes and rivers when people dump aquariums or bait buckets there.

Montana fights this threat on two fronts. One is the widely known FWP boat check station operations on highways and boat ramps, where watercraft are inspected and then decontaminated if found to contain invasive species. Consider this Montana's AIS *defense*.

The other, less-publicized front is the AIS *offense*. This is where early-detection crews look for small invasive populations that may have recently arrived but haven't yet spread. New detections are more likely to be controlled or eradicated, "but once infestations really take hold and spread, it's pretty much game over," McLane says.

AIS specialists search for all sorts of unwanted plants and animals, especially those considered highest risk due to their potential economic and ecological harm. In addition to the mussels and Eurasian watermilfoil, crews look for non-native clams, New Zealand mudsnails, faucet snails, flowering rush, curlyleaf pondweed, fragrant water lily, and more than a dozen other species.

Lacking resources to check every pond, lake, reservoir, stream, and river, AIS crews focus on waters at greatest risk. These include those with extensive boater use, known infestations of other invasive species, high levels of calcium (which fosters invasive mussel growth), and high use by boaters moving to and from other waters—especially those in other states. "By focusing our efforts on those waters, we're making the most effective use of our funding," McLane says.

After AIS officials identify the roughly 350 to 400 waters to be checked each year, early detection and monitoring crews head out in spring. On lakes and reservoirs, specialists drag thin-mesh plankton nets that collect free-floating plankton and any microscopic mussel larvae. To collect larger creatures, like

SCRAPING SLED AIS crew members use a benthic sled at Lake Elmo to collect invasive clams (below) discovered in 2019. Dragged behind a boat, the sled scrapes a layer off the lake bottom into a net that collects material as small as ¼ inch long.

crayfish and adult snails, mussels, and clams, they use kick nets in shallow water and scrape mud samples from lake bottoms. Crews also rake up aquatic plant samples, scour shorelines, and check under docks and submerged rocks. Snorkelers and scuba divers search for submerged non-natives.

Plankton samples are sent to FWP labs in Helena and Kalispell, where technicians look for mussel larvae through microscopes. In 2020, FWP labs examined 1,852 samples gathered by department crews and another 845 from other partners like the Flathead Lake Biological Station, Clearwater Resource Council, the U.S. Army Corps of Engineers at Fort Peck Reservoir, and Whitefish Lake Institute. Some water samples go to an out-of-state lab that tests for traces of invasive species' DNA.

AIS and diseases also reach new waters when fish are stocked or moved from hatcheries. That's why another component of the AIS offense is annual invasive species and fish health inspections required at federal, state, and commercial hatcheries before fish are transferred within Montana. AIS staff also keep an eye on other states, especially those along the Great Lakes and close to Montana. "We're constantly on the lookout for new species showing up there to know what to look out for here," Schmidt says.

RAPID RESPONSE

Early detection and monitoring work. Over the past 17 years, FWP and partner groups have verified new AIS infestations in more than 50 waterbodies. After a discovery, monitoring crews keep tabs on the population and measure the effectiveness of control measures. The most intensive monitoring has been on Tiber and Canyon Ferry following the 2016 detection of mussel larvae in plankton samples. After searching for three years and finding no further evidence, FWP stopped inspecting and decontaminating boats leaving Canyon Ferry. Similar restrictions could be lifted on Tiber by 2022 if crews continue to find no adult or additional larval mussels there.

Depending on the invasive species and

Tom Dickson is the editor of Montana Outdoors.

DRAGGING THE LAKE AIS monitoring technician Paul Bramblett tosses a plant rake into Spring Meadow Lake to gather vegetation for analysis. "People have a lot of questions," Bramblett says. "Sometimes they come up and ask, 'Are you guys looking for a body?'"

> **This is a classic example of how people who are out recreating are often the first to notice something weird and then report it to FWP."**

type of water where it is found, FWP tries to contain or eradicate any newly discovered population. Smaller waterbodies may be drained, as occurred recently on three ponds near Gardiner where curlyleaf pondweed was discovered. Crews will also drain Lake Elmo this fall to rid the popular Billings swimming and fishing water of invasive clams found in 2019. Afterward FWP will refill the lake and stock it with game fish.

Smaller vegetation infestations are pulled by hand or covered with fabric mats that block sunlight, killing the plants. At Noxon Rapids and Cabinet Gorge reservoirs, FWP and the Sanders County Aquatic Invasive Plants Task Force use herbicides, cutting, pulling, and raking to open areas around ramps and docks clogged with Eurasian watermilfoil. After New Zealand mudsnails were discovered in FWP's Bluewater Fish Hatchery near Bridger, all the fish were destroyed and the facility was completely drained, decontaminated, and dried.

McLane says the hatchery discovery and response is another example of how early detection helps. "People sometimes say, 'Why bother? These species will just get here anyway.' My answer is that if we can respond fast enough, like we did at Bluewater, we can keep a bad situation from getting worse."

McLane admits that not every infestation, even if detected early, has a solution. "In cases like the Madison and Missouri rivers, where New Zealand mudsnails are widely established, there's no feasible control program," he says.

FWP recommends boaters and anglers using those and other waters always clean, drain, and dry their watercraft, fishing gear, and waders to prevent spreading the tiny mudsnails, which can cling to vegetation or hide in mud left on gear. "New Zealand mudsnail females can reproduce by cloning themselves, so it only takes one snail to start a new infestation," McLane says.

PEOPLE AND OTHER PARTNERS

FWP can't execute its AIS offense alone. Due to Montana's vast size and many waters, the agency partners with dozens of associations, groups, communities, tribes, and state and federal agencies to prevent new infestations. "A major challenge with early detection is there aren't yet many organisms to detect, so they can be super difficult to locate. That's why we need as many eyes out there as possible," Thomas Woolf, FWP's AIS Bureau chief, says.

Many organizations recruit "citizen scientists" to help. For instance, volunteers

CLOCKWISE FROM TOP LEFT: JOHN WARNER, THOM BRIDGE, JOHN WARNER

NEVER-ENDING SEARCH Top left: Brian Hagan lifts a hunk of vegetation collected with a plant rake at Hauser Reservoir. FWP's AIS crews check 350 to 400 waters each year, and over the past 17 years have verified new infestations in more than 50 waters. Top right: Hagan loads a boat onto a trailer at Hauser. AIS crews motor to the middle of reservoirs and large lakes, where they use plankton nets to search for microscopic larvae of invasive mussels. Before moving to another water, they soak the nets in vinegar to kill any lingering organisms. "We don't want our nets to be a vector that spreads invasive species," says Hagan. Bottom right: Vegetation, plankton samples, and suspect snails and other organisms are sent to the AIS lab in Helena, where Keegan Effertz and another lab technician examine and identify specimens. In 2020, the Helena lab and another in Kalispell examined 1,852 samples gathered by FWP crews and another 845 from partner organizations and agencies. Bottom left: Looking for organisms at Spring Meadow Lake to send to the lab for analysis.

with Swan Valley Connections, the Blackfoot Challenge, the Clearwater Resource Council, and the Missoula County Weed District sample Holland, Van, Lindbergh, and Swan lakes three times each year to look for invasive mussel infestations.

JUST OUT FISHING

Then there's the regular people out fishing, boating, and walking lakeshores who spot something weird and report it. That was the case in 2018 when Tom Jacobson and a friend were walleye fishing on Lake Frances, northwest of Great Falls, and noticed tiny clams and snails clinging to their line and lures. Jacobson, a state senator, put the gastropods in a lure box and delivered them to FWP staff for identification. Though the clams turned out to be native, the snails were invasive faucet snails, which carry parasites deadly to waterfowl and were blamed for the deaths of hundreds of coots on Georgetown Lake in 2006. "That was a great example of how people out recreating are often the first to notice something weird and then report it to FWP," says McLane.

This past December, an angler sent the department photos of invasive red-rimmed melania snails spotted in the Missouri River near Great Falls. An FWP crew quickly investigated the site and found no additional specimens, but will continue to monitor the water in 2021. "We figure the snails got there when someone dumped out their aquarium, which is illegal but unfortunately common," McLane says.

As for Alicia Stickney, the woman who may have saved Whitefish Lake by spotting Eurasian watermilfoil in Beaver Lake, the most important lesson she learned is to always be on the lookout for anything unusual in or along a lake or river. "It's important for people to recognize that Montana has all these pristine waters and then be curious whenever they see something odd that could pose a threat," she says.

The plant or animal might turn out to be harmless. Or it could be a destructive species that, if caught in time, won't have the opportunity to ruin a part of Montana's great outdoors.

CLEAN. DRAIN. DRY.
Learn more about protecting Montana waters from aquatic invasive species and report possible AIS at
CleanDrainDryMT.com

CLOCKWISE FROM TOP LEFT: THOM BRIDGE; THOM BRIDGE; MONTANA FWP; THOM BRIDGE

The "Next 100"

Call for recommendations

In 2013 *Montana Outdoors* published a "Best 100" issue, featuring the 100 things people can see and do to fully appreciate Montana's state parks, mountains, forests, waters, and the fish and wildlife that live there. It's been our most popular issue ever.

Now we're working on the "Next 100" issue, for July-August 2022, featuring an additional 100 places and experiences for people to visit or do to further engage in Montana's natural world. **This time we're soliciting suggestions from *Montana Outdoors* readers.**

If you have a place or activity you think is essential for fully appreciating the state's outdoor world, please email us at montanaoutdoors@mt.gov (see instructions at right).

Obviously we can't consider places or experiences included in the original Best 100 issue. Before submitting, **please review the list below or visit the special "Best 100" issue by scanning the QR code or visiting https://qrgo.page.link/x17gD to make sure your recommendation is a NEW one.**

Best 100 Special Issue

We can't acknowledge submissions when they come in. If we choose your recommendation, you'll see it featured in the July-August 2022 issue along with your name.

—Editor

To submit your recommendation for our "Next 100" issue, email us and let us know:

1. the essential outdoors place or activity;
2. where it is located or best done; and
3. the best time of year it can be seen or experienced.

Before submitting, please check the list below to ensure we didn't previously include it in the original Best 100 issue.

Best 100 (2013)

- Visit **Sun River WMA**
- See **sandhill cranes** perform their mating dance
- Hear an **elk bugle**
- Smell a **ponderosa pine**
- See a **moose**
- Hike to an **alpine lake**
- Pick a quart of **morel mushrooms**
- View **Egg Mountain**
- See a **prairie dog town**
- Fly-fish the **Blackfoot Reservation**
- See **western grebes** conducting their rushing ceremony
- Hunt a **Block Management Area**
- Observe **mountain goats**
- Fish with a **guide**
- Watch **mule deer "stot"**
- See the **northern lights**
- See a running **pronghorn** herd
- Walk along the **Old North Trail**
- Visit the **Varney Bridge** section of the Madison River
- Learn to **cast a fly rod**
- Learn to **read a topo map**
- Visit a **pishkun** (buffalo jump)
- Hike while carrying **bear pepper spray**
- See the **Chinese Wall**
- Drive around **Flathead Lake**
- Visit a **hunter check station** in November
- Get stuck in **gumbo**
- See a **burrowing owl**
- Visit **Bighorn Canyon**
- Backpack the famous **Beartooth Traverse**
- Catch a **walleye**
- See the **world's largest western larch**
- Fish all of Montana's **blue-ribbon rivers**
- See a **swift fox**
- Float the **Smith River**
- See **beargrass** in bloom
- Look for **shed antlers**
- Go **ice fishing**
- Admire William Clark's signature at **Pompeys Pillar**
- **Ask permission** to hunt private land
- Call in a **tom turkey**
- Hike to **Grinnell Glacier**
- See the **fall golden eagle migration** at Rogers Pass or Bridger Mountain Ridge
- Go on an **outfitted backcountry trip**
- Spot a **white-tailed ptarmigan**
- Hear a **wolf howl**
- See **Kootenai Falls**
- Catch an **Arctic grayling** in the Big Hole River
- See the **Giant Springs**
- Visit an **ancient tipi ring**
- Hike up **Square Butte**
- Spot a **mountain lion track**
- Fish **Nelson Reservoir**
- See the **snow geese at Freezout Lake**
- Visit **Fort Peck Dam**
- Pick a quart of **huckleberries**
- Learn to **row a drift boat**
- Snag a **paddlefish**
- "Play" the **Ringing Rocks**
- Bike the **Hiawatha Trail**
- Hunt upland birds over a **pointing dog**
- See a **long-billed curlew**
- Take the **Going-to-the-Sun Road** drive
- Float the Missouri River **White Cliffs area**
- Fish the **Mother's Day caddis hatch**
- See wild sheep at **Koo-Koo-Sint Viewing Site**
- Catch a Columbia River **interior redband trout**
- Go **elk hunting**
- See **sage-grouse and sharp-tailed grouse** on their spring mating grounds
- Join the annual **Audubon Christmas Bird Count**
- See **quaking aspen** in fall
- **Tie a fly**
- Walk under the **Roosevelt Arch** at Yellowstone National Park
- See (and hear) a **prairie rattlesnake**
- **Hike a prairie** in June
- Catch a **westslope cutthroat trout**
- Explore **Lewis and Clark Caverns**
- Fish a lazy **warmwater river**
- Take the **CMR National Wildlife Refuge auto tour**
- See a **greater short-horned lizard**
- Visit the **Ross Creek cedars**
- See evidence of **Glacial Lake Missoula**
- Cook in a **dutch oven**
- Visit a **prairie pothole**
- See the **Madison River Canyon Earthquake Area**
- Hear a **loon call**
- Fish the **salmonfly hatch**
- Float the **South Fork of the Flathead River**
- Collect a **moss (Yellowstone) agate**
- See **wild bison at the National Bison Range Wildlife Refuge**
- Fish the **Blackfeet Indian Reservation lakes** for monster rainbows
- See **harlequin ducks**
- See **wild mustangs**
- Drive the **Beartooth All-American Road**
- Spot a **grizzly**
- Visit the badlands and rock formations of **Makoshika and Medicine Rocks state parks**
- See a **western tanager**
- See **bitterroot** in bloom
- Visit **Red Rock Lakes NWR**
- Soak in a **hot spring**

PIT STOP Snow geese and other waterfowl refuel during an April stopover in the grain-rich fields of North Shore Wildlife Management Area.

BIRDS *and a* BARN

North Shore Wildlife Management Area conserves critical waterfowl habitat while preserving a piece of the Flathead Lake region's agricultural heritage. By Butch Larcombe

It's about 5:30 a.m. in mid-June, and as the sun crawls up over the Swan Range to the east, sunlight slides across the valley floor at the north end of Flathead Lake. It first reveals the tips of tall stands of ponderosa pine and Douglas fir scattered amid a carpet of flowering canola. Moments later, as the light brightens, the century-old McClarty Barn emerges from the shadows.

This unveiling is repeated, with seasonal variations, on many mornings at the landmark barn. The iconic structure sits center stage on North Shore Wildlife Management Area just south of Montana Highway 82 between Somers and Bigfork. Montana Fish, Wildlife & Parks owns and manages the 427-acre wildlife area, a haven for migrating ducks, geese, shorebirds, and tundra and trumpeter swans, as well as white-tailed deer, upland birds, raptors, and dozens of songbird species.

In addition to its abundant wildlife and colorful barn (more on that later), the North Shore WMA represents an important piece in a quilt of private and public land that adjoins the 1,704-acre Flathead Waterfowl Production Area (WPA) that's managed by the U.S. Fish & Wildlife Service. Together, the two public parcels, and smaller private holdings, comprise the largest stretch of undeveloped shoreline on Flathead Lake, one of the nation's largest and cleanest natural freshwater lakes.

The barn and WMA are testament to the power of foresight and collaboration that has preserved open space and benefited birds, hunting, wildlife watching, and water quality, all while honoring the Flathead Valley's agricultural heritage. In the eyes of many, including Gael Bissell, now a retired FWP wildlife biologist, North Shore WMA has achieved a key goal of "protecting some of the valley's most important wildlife habitat while allowing people to enjoy this area during much of the year," she says.

While employed by FWP, Bissell joined with individuals and representatives of other agencies and conservation groups to

Butch Larcombe spent more than 30 years working for Montana newspapers, which included working as the editor of Montana Magazine. *He lives near Bigfork.*

CLOCKWISE FROM TOP LEFT: DICK WALKER; BUTCH LARCOMBE; MAP BY LIVE OUTDOOR/MONTANA OUTDOORS

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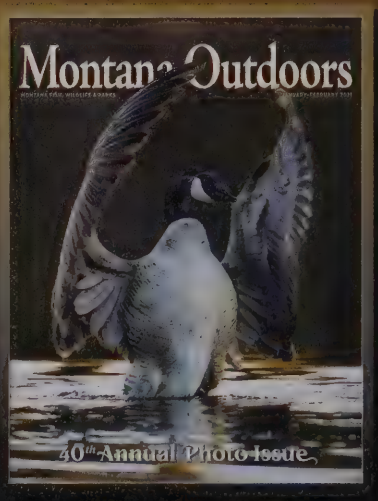

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help establish the wildlife area. Along with improving waterfowl and other wildlife habitat, those collaborators had an additional goal: Stave off some of the area's residential development, especially between the lake and Highway 82. North of the highway, subdivisions are gradually altering the character of the Flathead Valley, making it look more like a "suburban anywhere" rather than the rural Montana so many residents and visitors value.

LOCAL ICON For more than a century, the McClarty Barn has stood as a landmark along Flathead Lake's north shore. Acquisition of North Shore WMA included the beloved structure.

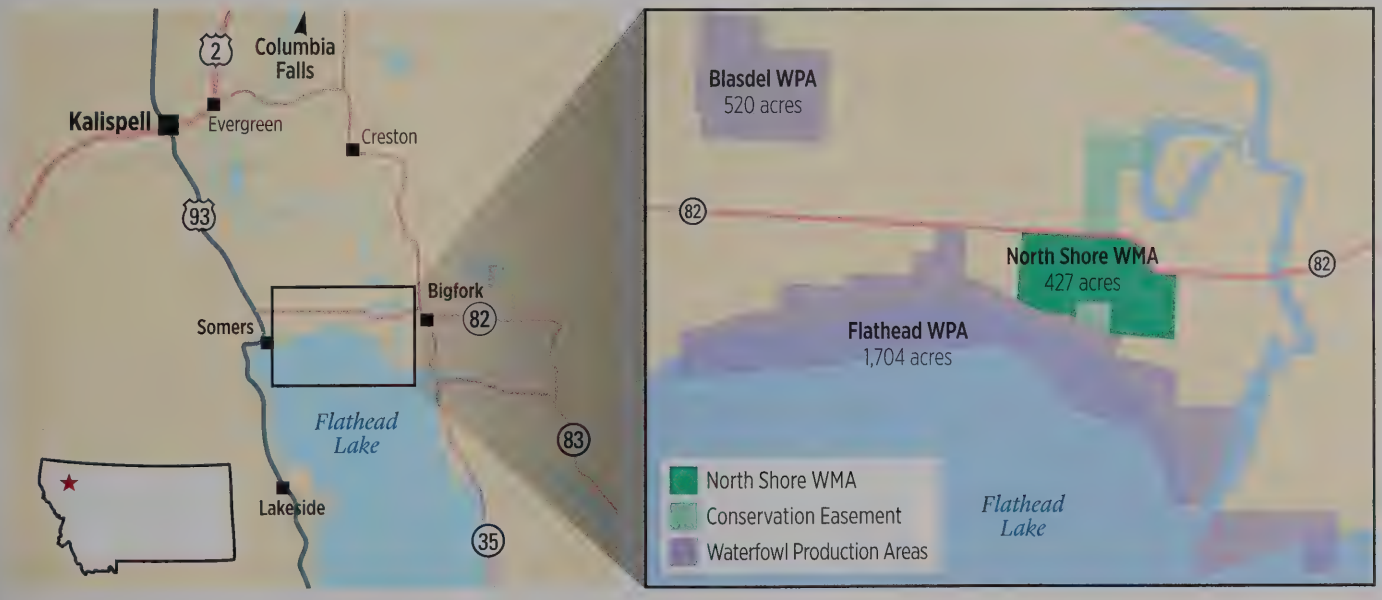
SPURRED BY SUBDEVELOPMENT

Spurring efforts to protect the area was a proposal for a large subdivision that could have brought several hundred homes to the north shore near Somers. That plan was sidelined in part by the Great Recession of 2008-09. But subsequent new commercial development and For Sale signs sprouting on farmland along Highway 82 east of Somers fueled renewed protection concerns. "Keeping rich farmland like this in agriculture is important for sustaining local ag economies and protecting food security," says Laura Katzman, a land protection specialist with the Flathead Land Trust.

The North Shore WMA, coupled with the federal WPA and adjacent conservation easements "are a tremendous buffer between the rapid development happening in the valley and around Flathead Lake," says Bissell.

Many of the WMA's supporters—individuals, public agencies, and nonprofit groups—are part of the broader River 2 Lake Initiative. R2L works to protect land and water between Columbia Falls, where the Flathead River's three forks converge, and the lake. Projects focus on wetlands, floodplains, and vegetated river and stream beds that naturally filter agricultural and pavement runoff before it reaches the lower river and lake, helping keep water clean.

North Shore WMA was formed from 2008 to 2016 with three land purchases totaling nearly $3.9 million. The money came from FWP, the Bonneville Power Administration's Fisheries Mitigation Program, The Nature Conservancy, and the Pittman-Robertson Program (which redistributes a longtime federal tax on the sale



SAVED FROM DEVELOPMENT North Shore WMA sits just south of Highway 82 between Somers and Bigfork, abutting Flathead Waterfowl Production Area. Acquisition of the wildlife area was spurred by growing residential development south of the highway in the early 2000s.

BIG BIRDS Among the waterfowl species using North Shore WMA are trumpeter swans and far-more-common tundra swans (shown here, identified by their yellow beak patches).

of firearms and ammunition). Supporting the project were hunters, bird watchers, local landowners and residents, and Flathead Lake fans.

ACCESS TO OPEN SPACE

Some parts of the WMA and adjoining WPA are closed in the spring and early summer to protect nesting waterfowl. Hunting is allowed in the fall, and the small areas near the barn and a hay shed to the west offer year-round access for birders and history buffs.

Prime wildlife beneficiaries of the protected wildlife area are vast flocks of migrating waterfowl and shorebirds. FWP restoration ecologist Franz Ingelfinger explains that the WMA sits in a shallow basin where spring runoff creates flooded fields of spent grain from the previous year's harvest, attracting geese, ducks, and swans heading north. "They use the area as a refueling station," he says.

Anywhere from 20,000 to 50,000 waterfowl briefly use the area each spring, followed by smaller numbers of diverse shorebird species, says Bissell, who heads the Flathead Audubon Society chapter. "The intense waterfowl and shorebird use often lasts just a few weeks each spring, but it's very important," she says.

To ensure adequate "fuel" for the birds, FWP contracts with an area farmer who plants and harvests the fertile land in exchange for leaving a portion of the crops unharvested with high stubble, for wildlife food and cover. Typical crops include canola, spring and winter wheat, peas, and lentils, often separated by buffer strips of taller vegetation.

Ingelfinger talks with the current farmer regularly to discuss how best to raise crops that benefit wildlife. "We were recently discussing creative ways to improve wildlife cover and forage in an area that's typically hard to farm and has been trending toward less desirable species like foxtail and canary grass," Ingelfinger says.

A CENTURY OF FARMING

Joseph and Kate McClarty put down homestead stakes on 160 acres of fertile soil along Flathead Lake's north shore in the early 1900s, growing crops and operating a well-drilling business. Joseph and Kate eventually moved back to Canada, but their son Percy and his wife Esther continued to farm the land while raising a family. They added the hay barn to the homestead, likely between 1912 and 1915, according to state historic preservation records.

The McClarty family sold the farm to Montana Power Company when construction of SKQ Dam (originally Kerr Dam) near Polson threatened to raise lake levels and submerge the property. After the dam was completed in the late 1930s, it turned out the land didn't flood, and the power company sold the farm in the 1950s to Edward and Mabel Wittlake. The Wittlakes added a metal Quonset structure to the west side of the barn as part of a short-lived hog operation.

About four decades later, Kalispell attorney Darrell Worm bought the farm and its highly visible barn from the Wittlake family. "I had always admired the property," Worm says. "I drove by there every day and didn't want to see it deteriorate."

While he rented out the farmland, Worm eventually began talking with the Flathead Land Trust about the future of the property and barn. In 2013, he agreed to sell the farm to FWP in a deal that also involved the land trust and funding from the Bonneville Power Administration. Among its many responsibilities, the federal agency pays to mitigate fish and wildlife habitat lost from constructing hydropower facilities in the Northwest. "Darrell agreed to sell the land at a bargain rate in order to achieve a conservation outcome and future public ownership," says Paul Travis, executive director of the land trust.

> **"We're hoping that once people stop to look at the barn they also can learn about migrating waterfowl, FWP habitat management, and the importance of protecting critical habitats."**

Bissell says the main draw for FWP was the property's enormous potential to benefit migrating waterfowl and provide an important buffer along Flathead Lake's shore.

In addition to cutting the wildlife agency

WMA OF MANY USES Clockwise from top: Canola is one of several crops grown on the WMA. Rather than pay FWP to farm the land, a local farmer agrees not to harvest a portion of the crops and leave high stubble for food and cover. The new wildlife area benefits duck hunters, like this one shown on Flathead Lake, and bird watchers who delight in seeing waterfowl, shorebirds, and wading birds such as the white-faced ibis.

a deal on the property, Worm paid to help restore the barn, the last structure remaining from the original McClarty homestead. That eased concern among the barn's many fans that the 100-year-old landmark would be torn down.

A local contractor was hired to repair, replace, and paint the barn's siding, re-install and repair a damaged metal roof, rebuild the original cupola, restrict pigeon access, and build an interior stairway. Volunteers, including neighbors, Worm, and members of Ducks Unlimited and the Flathead Land Trust, helped clean the barn, shoveling out a dump-truck load of pigeon droppings.

FEELING AN ATTACHMENT

Chere Jiusto, executive director of the Montana Preservation Alliance and co-author of *Hand Raised*, a book about Montana's historic barns, says "heritage barns" like the McClarty structure hold a powerful allure and are worth saving. "They are honest buildings," she says. "People just feel an attachment to the story of these barns."

The red-and-white structure, a few windmills, and pieces of old machinery on the property are reminders that farming and family life are deeply rooted along the north shore of Flathead Lake. And for Ingelfinger, the barn provides an opportunity to attract people to a public site they might otherwise drive past. "It's definitely an attraction," he says. "We're hoping that once people stop to look at the barn they also can learn about migrating waterfowl, FWP habitat management, and the importance of protecting critical habitats like the ones surrounding the barn."

Wonders under water

By Tom Dickson

Whenever I drive over or past a river, lake, or stream, I like to imagine what's swimming down there beneath the water surface.

If I'm in western Montana, it could be some of our famous salmonids: native westslope cutthroats, federally protected bull trout and Arctic grayling, mountain whitefish, nonnative browns and rainbows, or those pretty little brook trout beloved especially by older anglers who hike the hills to fish their secret stretches. But there's much more.

A person poking around these waters might also encounter largescale suckers, peamouth, northern pikeminnows, longnose dace, or various sculpins—little bug-eyed fish with oversized heads that scurry along stream bottoms. One of the most seasonally beautiful fish is the redside shiner, a 4- to 6-inch minnow that lives in northwestern rivers, lakes, and ponds. For most of the year a drab olive brown, during spring breeding season the male lights up with bold, bright crimson stripes along its sides.

Across the Continental Divide in central and eastern Montana, I'll drive past streams, lakes, or rivers with even greater piscatorial diversity. That's due to the region's warm, fertile waters and the vast Missouri River watershed stretching hundreds of miles to the east.

Well known are the game fish: walleye, sauger, paddlefish, smallmouth bass, northern pike, channel catfish, black and white crappie, and yellow perch. Far less so are the freshwater drum, a close cousin to the saltwater redfish, and the goldeye, a species snubbed here for its mushy, bony fillets but prized in Manitoba as a delicacy when smoked over an alder fire.

Also swimming in prairie streams are several shiner species, named for their iridescent scales that flash in the underwater sunlight. Shiners, dace, and chubs are all members of the minnow family. Most of these leucisids, as biologists call them, have a scaleless head and spineless fins, plus one to three rows of pharyngeal "teeth." Minnows use these hard throat structures like a mortar and pestle, grinding food against a rough-textured pad until soft enough to digest.

Minnows also possess what's called a Weberian apparatus, a series of small bones connecting the swim bladder to the inner ear that allows the fish to "hear" vibrations—like those from a fast-approaching sauger.

A particularly distinctive minnow is the northern pearl dace. This glacial relic was pushed south from Canada 15,000 years ago with the last ice age, then left behind in small, cool streams north of the Hi-Line as the glaciers retreated.

Then there's the Iowa darter, not a minnow but a tiny fish that resembles one. A slender, 2-inch-long cousin of the walleye, sauger, and yellow perch, it zips along stream bottoms in short bursts. In spring the male turns downright tropical, with 10 bright, bluish-green bands across each side and a spectacular blue and red dorsal fin.

Maybe the strangest northeastern Montana native fish is the brook stickleback, a species related to, of all things, the ocean-dwelling seahorse. It has a large head, oversized eyes, and scaleless sides lined with a row of bony plates. It also sports five short, thick spines along the back that look like the spikes on a cartoon bulldog's collar. As with several eastern Montana fish, including the toothy shortnose gar, this is the western-most range in the Lower 48 of a species most commonly found in the upper Midwest.

Fish are an important yet largely invisible part of Montana's natural heritage. Birders and wildlife watchers can marvel at animals with binoculars or the naked eye. But the only way to see many fish species is to catch them, which is one reason many of us go fishing. Catchable species remain hidden beneath the water's surface, mysterious and beyond our reach, except for those few magical moments when we pull one up from the depths to admire it, live and fully colored.

One way for people to at least see images of Montana's 57 indigenous and 34 nonnative fish species is via the Montana Natural Heritage Program's Field Guide (fieldguide.mt.gov), or the *Fishes of Montana* app developed by FWP and Montana State University. FWP is also working on a *Fishes of Montana* book, featuring color illustrations, due out next year.

A few months ago, people across the globe marveled as NASA scientists maneuvered a remote helicopter along the surface of Mars. I did, too. But I couldn't help but wonder, as we focused our collective attention on a planet 200 million miles away, what marvels await discovery in the underwater worlds many of us pass each day down here on Earth.

Tom Dickson is the editor of Montana Outdoors.

Tomentose burying beetle

Nicrophorus tomentosus

By Shane Sater

SCIENTIFIC NAME *Nicrophorus* derives from the Greek *necro*, meaning "dead." *Tomentosus* is Latin for "thickly covered with hairs."

The pitfall trap gave off a stomach-turning stench. I had planned to leave the yogurt container, buried to the brim to capture insects or small animals that tumble in and can't escape, for only a night or two. But a grass fire at the site had kept me away for a week. Now, the trap was full of dead black-and-orange beetles. I held my breath and fished them from a soup of dissolving grasshoppers and a putrefying shrew. Later, still holding my breath, I identified the insects as tomentose burying beetles.

The very stink that repelled me was, for these small-animal scavengers, the scent of opportunity.

APPEARANCE

Tomentose are large, mostly black beetles that reach ¾ inch long. Their abdomen, marked with wavy, orange bands, protrudes beyond the wing covers. Other burying beetles look similar, but only this one has dense yellow hair on its thorax.

HABITAT

Look for these beetles almost anywhere in Montana, from grassland to forest. Their primary habitat is the fresh carcasses of small animals. From feeding to breeding, every facet of these beetles' lives revolves around cleaning up the traces of death.

DIET AND BEHAVIOR

Imagine a freshly dead mouse or chickadee, maybe cached by a weasel or killed by a wildfire. Just after death, the smell is unremarkable to a human nose: neither putrid nor appetizing. But to a burying beetle, life hinges on tracking down this smell—and quickly, before too many competitors arrive. Tomentose burying beetles are expert sniffers. Using specialized chemical receptors on their antennae, they can home in on a freshly dead mouse from up to 2 miles away.

Once they arrive, they must rapidly evaluate the situation: Is the freshly dead critter small enough to bury? Is the soil workable? Burying beetles are accomplished excavators, a skill that allows them to thwart their main competitors: blow flies. If the carcass is too big to bury—a cottontail rabbit, for example—blow flies will land, lay eggs, and the maggots will strip the meat so quickly that any beetle larvae may starve.

BREEDING

Adult burying beetles can still feed on a larger carcass and its attendant maggots. But to reproduce, burying beetles need a partner, fresh meat small enough to bury, and speed. The first male on a carcass—a vole, perhaps—wafts pheromones from his abdomen to attract a female. If other males show up, a battle may ensue. Fighting isn't always the best strategy, though. Slightly larger carcasses sometimes host several pairs of peacefully breeding beetles, which may even help feed each other's young.

Before too many blow flies find it and lay eggs, the beetle pair drags the dead vole to where the soil is soft but holds its shape. Using their armored heads, they plow beneath the carcass. It sinks into the earth and they cover it with leaf litter, safe from competitors. The beetles strip the fur, form the vole carcass into a ball, and lay eggs.

They are unusually devoted parents. Like baby birds, young larvae nudge the mother, causing her to regurgitate food. Meanwhile, both parents tend the carcass, finding and killing blow fly larvae and preventing fungi from growing. They have helpers: Certain mite species hitch a ride on the beetles, from which they regularly dismount to devour blow fly eggs.

The beetle larvae develop rapidly, soon joining the adults in feeding on the buried vole carcass. In about a week, they are ready to enter their winter dormancy. In spring they will pupate before emerging as the next generation of adults. For the parents, their job here is done. It is time to move on in search of another carcass.

STATUS

Tomentose are widespread and abundant across most of temperate North America. Next time you find a small dead mammal or bird, look carefully for these fascinating cleaner-uppers.

Tomentose burying beetles moving a carcass underground.

Shane Sater is naturalist who works as a data assistant with the Montana Natural Heritage Program.

TOP TO BOTTOM: SHUTTERSTOCK; GAIL MOSER

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Whether it's through hunting, fishing, camping, boating, mountain biking, hiking, wildlife watching, or **wakeboarding in Bighorn Canyon,** Montana is a state where everyone can find their own special way to connect with the natural world. Around here, **the outside is in us all.** PHOTO BY TRACY ENTERLINE

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